



# **Micron Technology, Inc.**

## 2015 Winter Analyst Conference

# Safe Harbor

During the course of this meeting, we may make projections or other forward-looking statements regarding future events or the future financial performance of the Company and the industry. We wish to caution you that such statements are predictions and that actual events or results may differ materially. We refer you to the documents we file on a consolidated basis from time to time with Securities and Exchange Commission, specifically our most recent Form 10-K and Form 10-Q. These documents contain and identify important factors that could cause our actual results on a consolidated basis to differ materially from those contained in our projections or forward-looking statements. These certain factors can be found at <http://investors.micron.com/riskFactors.cfm>. Although we believe that the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee future results, levels of activity, performance or achievements. We are under no duty to update any of the forward-looking statements after the date of the presentation to conform these statements to actual results.



# Mark Adams

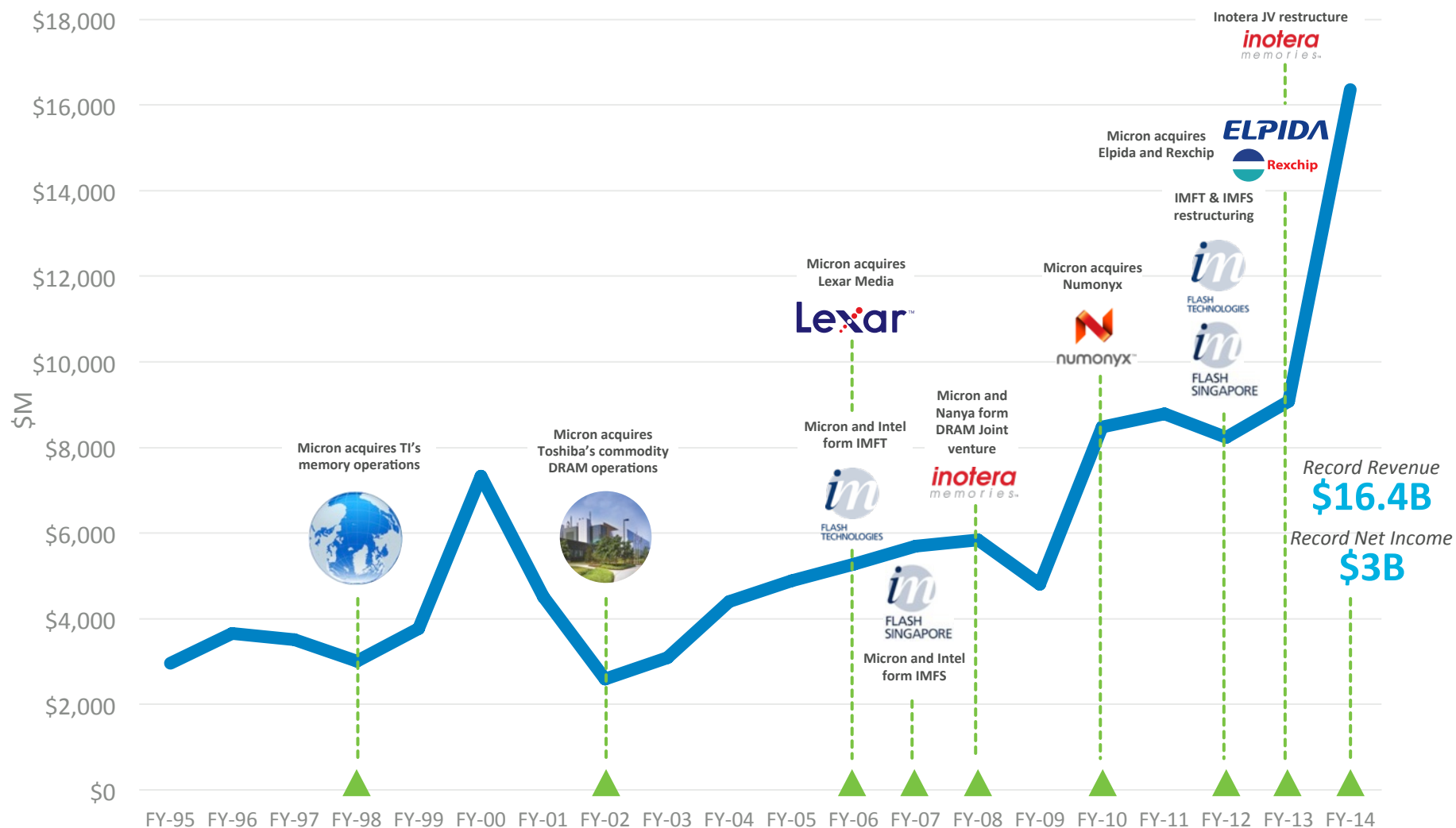
President



## Welcome & Presentation Overview

- Company Performance
- Investing for the Future
- Technology Roadmap
- Key Markets and Micron's Positioning
- The Future of Memory
- Finance and Strategy Update

# Micron's Historical Performance and Revenue



# Memory Market Conditions

## Consolidated Suppliers

- Suppliers with sufficient scale
- Return-focused investment and supply environment

## Low Supply Growth

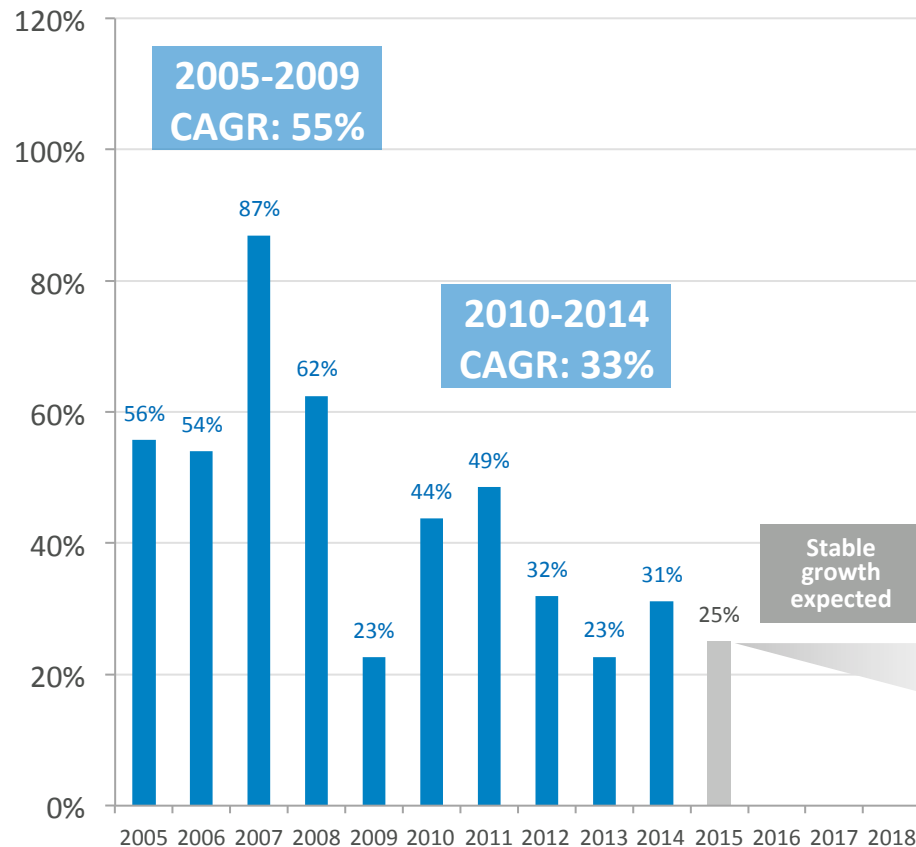
- Limited new wafer capacity
- Slowing technology migrations

## Diversifying Demand

- Differentiated products
- System solutions
- Diversified customers
- Broadening applications

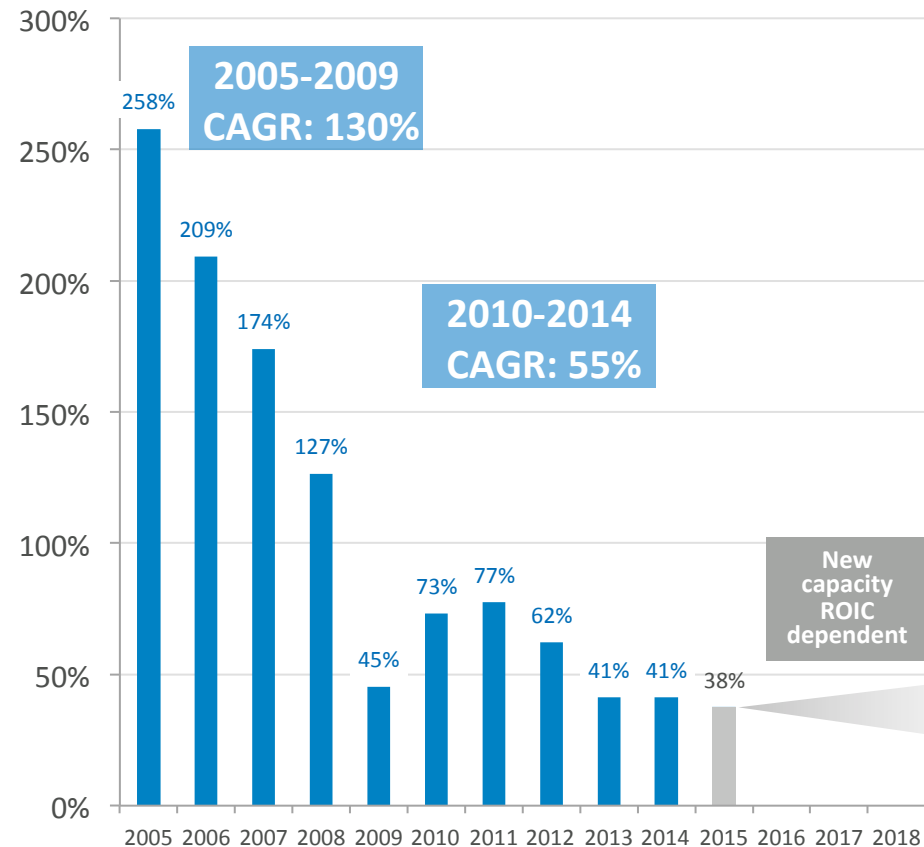
# DRAM and NAND Supply Growth Slowing

*DRAM Industry Y/Y Bit Shipment Growth*



Technology complexity increasing; wafer production stable or declining over time

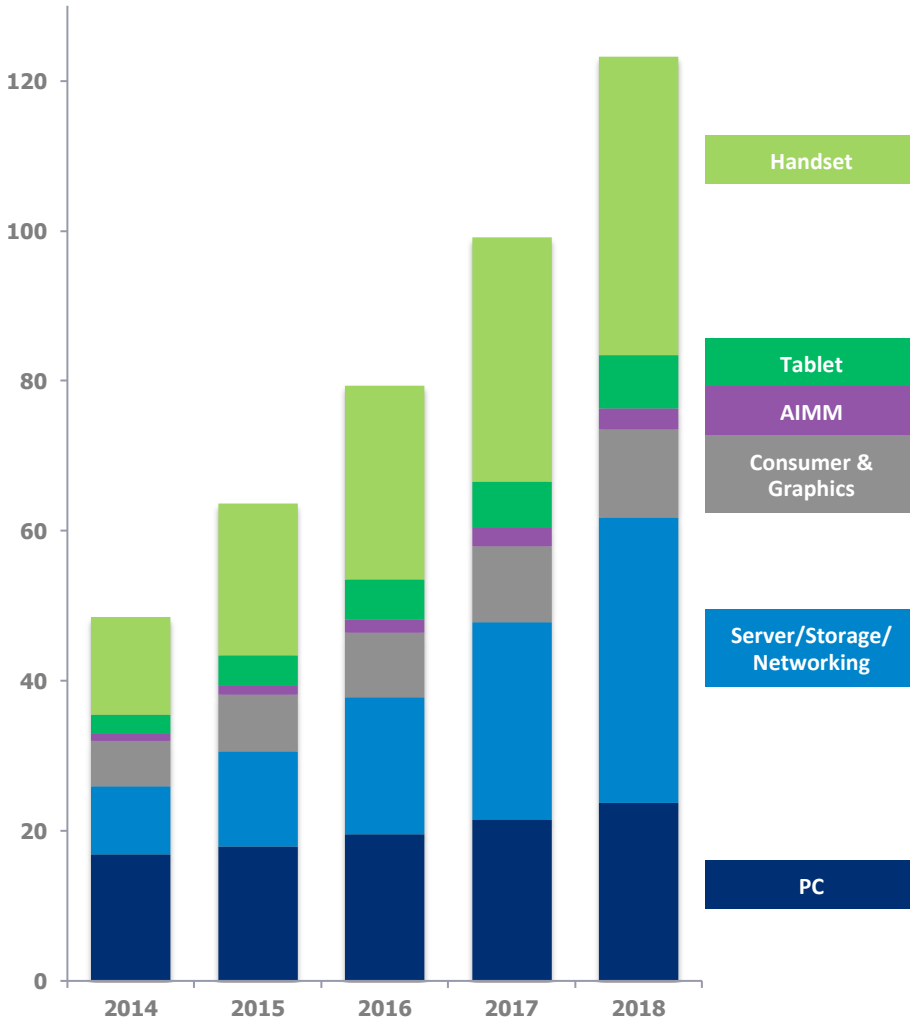
*NAND Industry Y/Y Bit Shipment Growth*



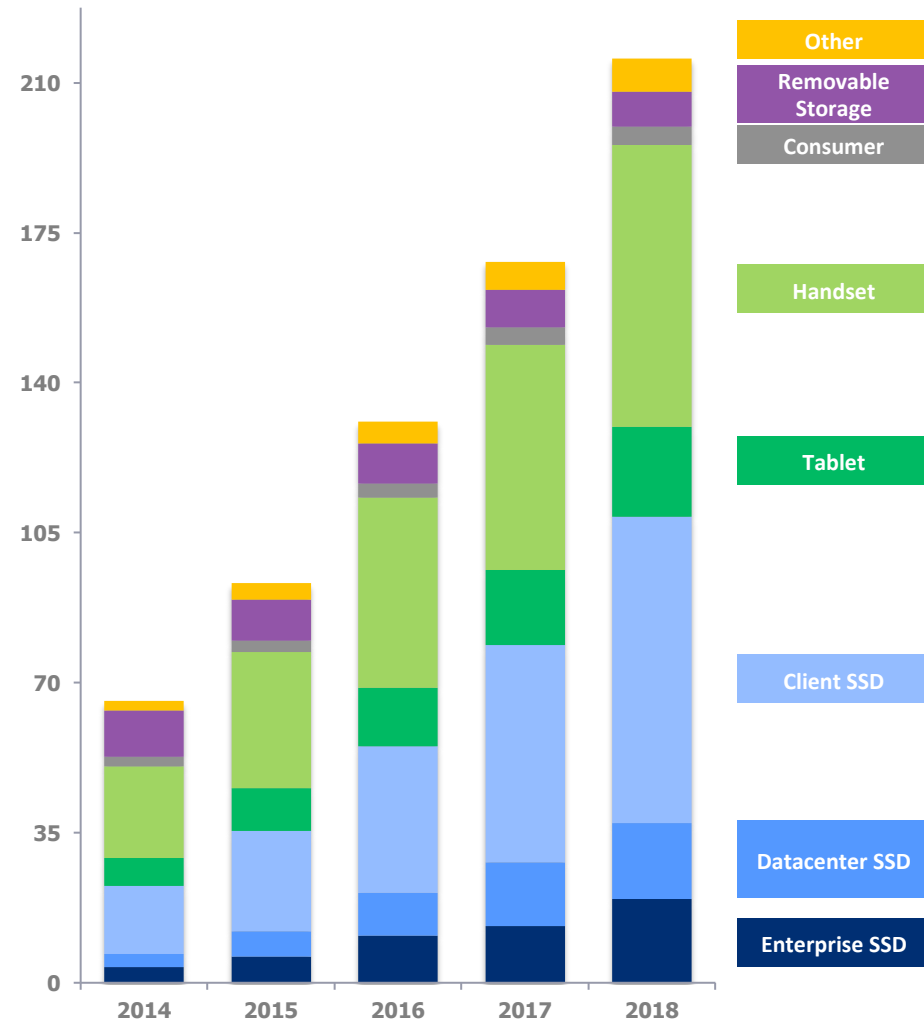
3D conversion does not result in increased industry supply growth absent wafer capacity additions

# DRAM Diversifying, NAND Supply Constrained

DRAM Industry Bit Demand (B Gb EU)



NAND Industry Bit Demand (B GB EU)



Tablets contain a mix of mobile DRAM, standard DRAM, and reduced-power solutions  
Upgrade modules included with PC

Source: Micron and Industry Analysts



# Operational Areas of Focus

## DRAM

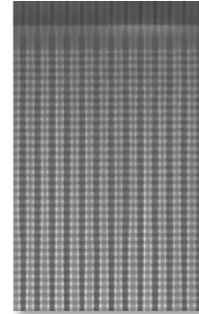
## NAND

### Technology

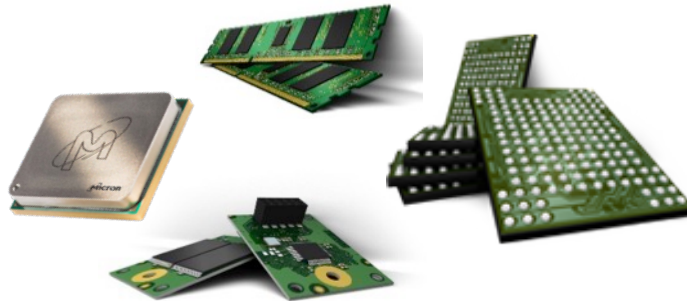
20nm DRAM



TLC & 3D NAND



### Product Enablement



### Operational Flexibility



# Investing for the Future

## Capital / R&D

- ~\$1.1B in CapEx for product and technology enablement in FY-15 and ~\$1.5B investment in R&D in FY-15
  - Emerging memory technologies
  - Advanced packaging and controllers
  - Assembly, test and world class quality

*Enhanced capability to deliver vertically focused memory solutions for long-term value creation*

## Strengthened Leadership

*Jeff Bader* - VP, EBU

*Tom Eby* - VP, CNBU

*Mark Glasgow* - VP, Enterprise Sales

*Steve Pawlowski* - VP, Advanced Computing

*Robert Peglar* - VP, Advanced Storage Solutions

*Robert Quinn* - VP, Strategy & Business Development

*Rajan Rajgopal* - VP, Quality

*Mike Rayfield* - VP, MBU

*Tom Snodgrass* - VP, Systems Solutions

*Darren Thomas* - VP, SBU

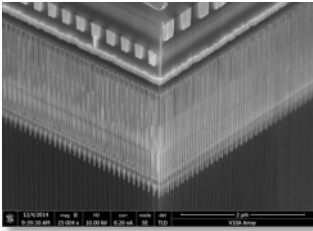
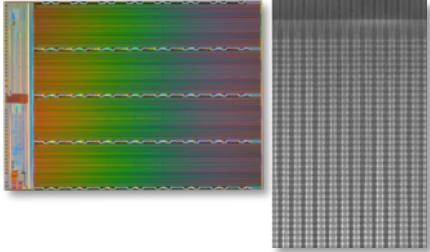
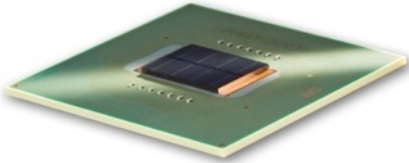
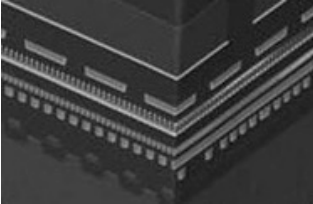
*John Waite* - VP, Supply Chain



# Scott DeBoer

VP of R&D

# Leading-Edge Technology Status

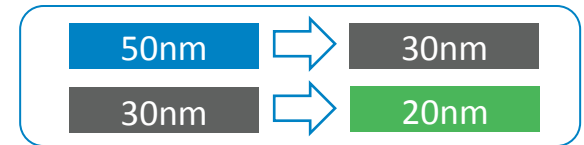
<b>DRAM</b>	 <b>1Xnm DRAM</b>	<ul style="list-style-type: none"> <li>Continued strong progress for 20nm yield at Hiroshima and Inotera facilities</li> <li>1Xnm development underway in Hiroshima and 1Y/1Znm in Boise</li> </ul>
<b>NAND</b>	 <b>3D NAND</b>	<ul style="list-style-type: none"> <li>16nm TLC NAND now ramping in Singapore</li> <li>Micron 1st generation 3D NAND on track for production in Singapore mid 2015</li> <li>Second generation under development in Boise</li> </ul>
<b>Package Technology</b>	 <b>Hybrid Memory Cube</b>	<ul style="list-style-type: none"> <li>3D NAND package technology continues to mature, currently manufacturing HMC generation 2</li> <li>R&amp;D focus on HMC generation 3 enablement for even higher density and bandwidth</li> </ul>
<b>New Memory Technology</b>	 <b>Cross-point memory</b>	<ul style="list-style-type: none"> <li>Multiple paths under active development for storage class memory enablement</li> <li>Targeting 2015 and 2017 for manufacturing introductions of next new memory technologies</li> </ul>

Images are not to scale

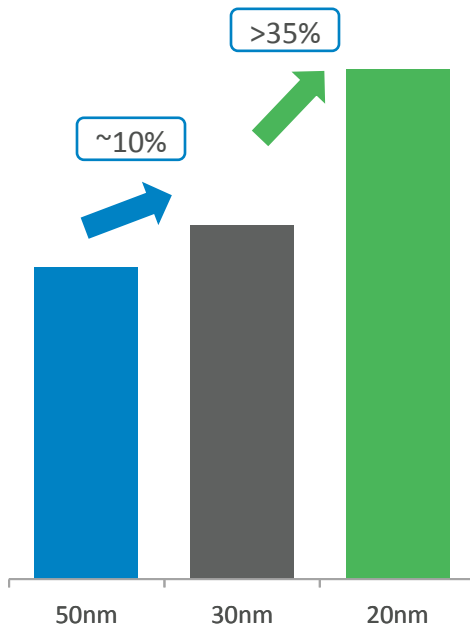
# Impacts of DRAM Process Complexity

- Large increase in number of process steps to enable shrink
- Conversion CapEx scales with the number of steps
- Significant reduction in wafer output per existing cleanroom area

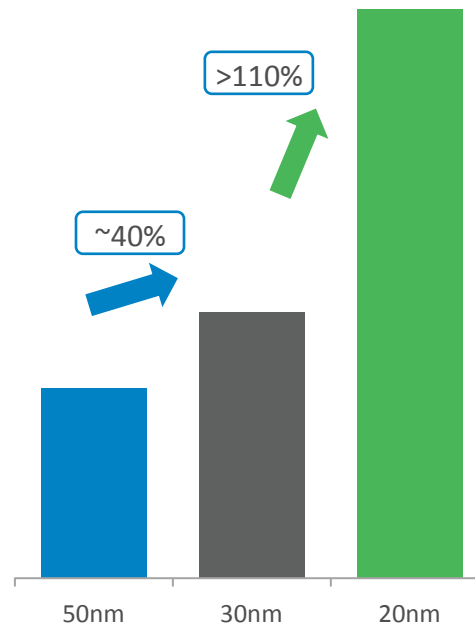
*Complexity comparison for enablement of ~100% bits/wafer increase*



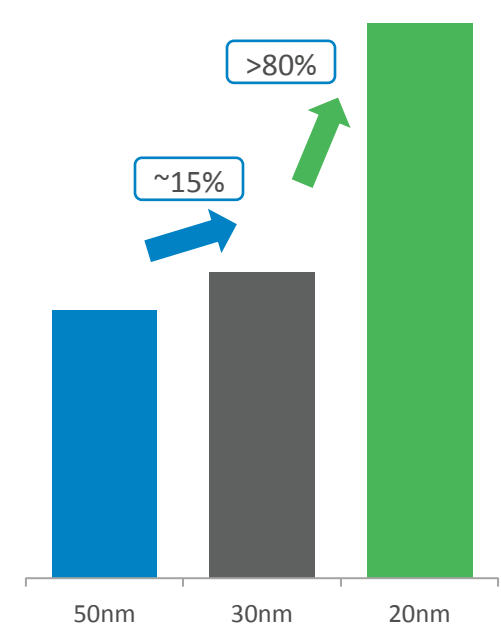
Number of Mask Levels



Number of non-Litho Steps per Critical Mask Level



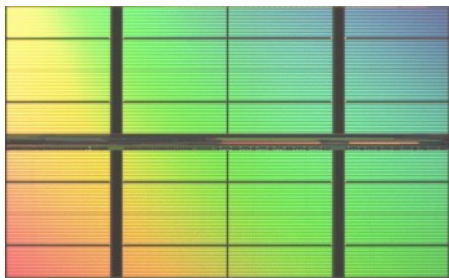
Cleanroom Space per Wafer Out



# Next Generations of DRAM: 20nm and 1Xnm

## Combined DRAM R&D Team Reaping Benefits

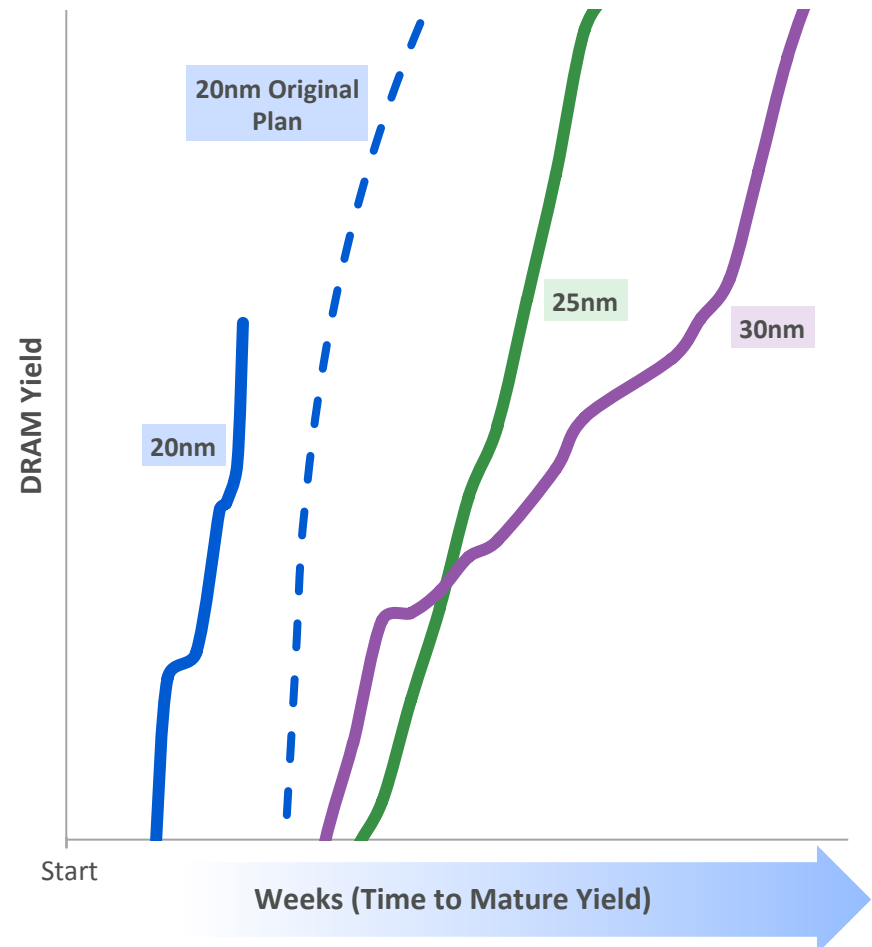
- Hiroshima R&D in manufacturing fab ensures knowledge share between manufacturing and R&D, enabling more rapid yield ramp
- Dedicated R&D operation in Boise enables more revolutionary DRAM R&D without impacting manufacturing
- Focus on enabling scaling path to sub-15nm DRAM



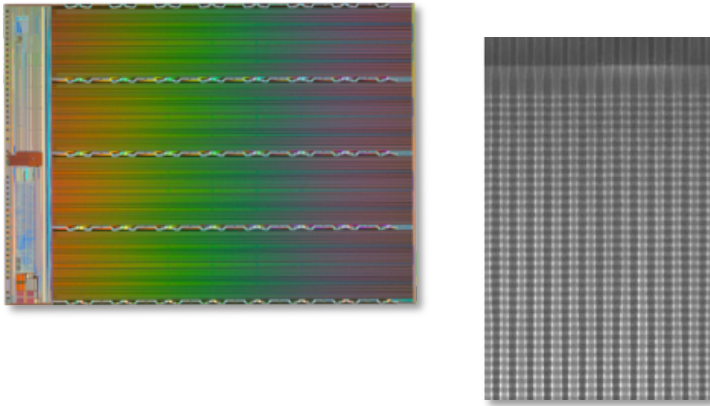
1Xnm DRAM

*1Xnm driving >30% improvement in cost per Gb over 20nm*

## Yield Ramps Improving



# 3D NAND Comparison with Planar NAND Scaling

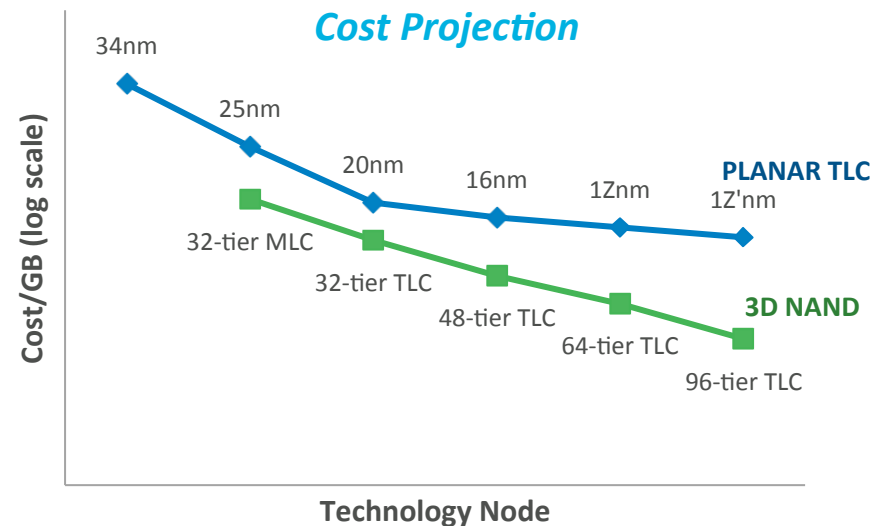
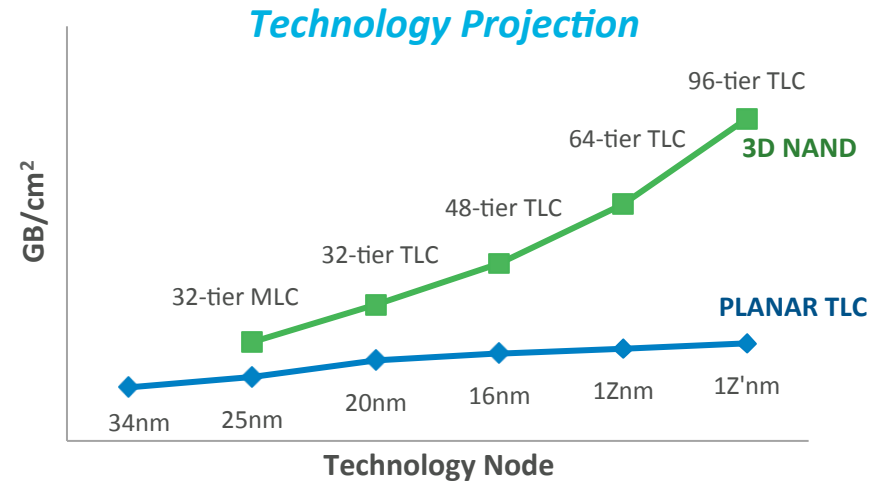


- **Planar NAND scaling**

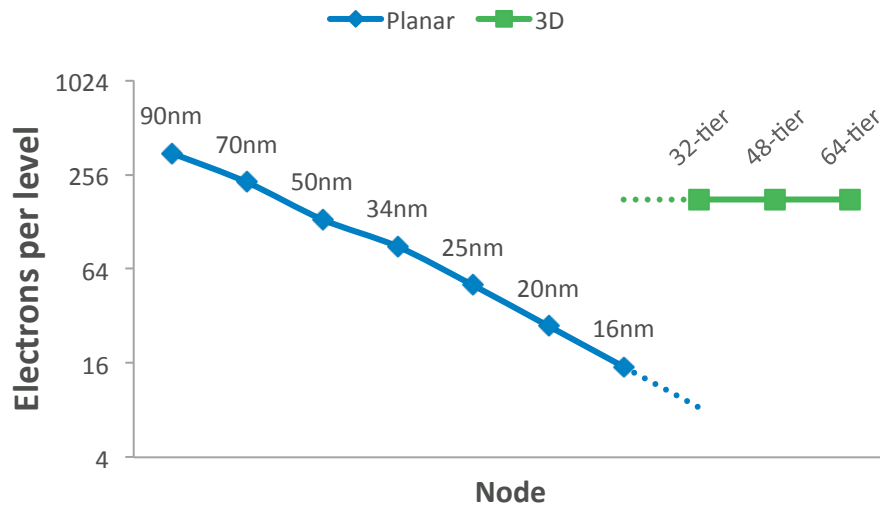
- Planar can be scaled below 16nm, but performance and cost are not competitive with 3D NAND
- Micron focused 100% on 3D NAND after 16nm

- **3D NAND scaling**

- 3D NAND cost improvement over planar expands with subsequent nodes
- 3D NAND cell architecture enables significant performance improvement relative to planar technology

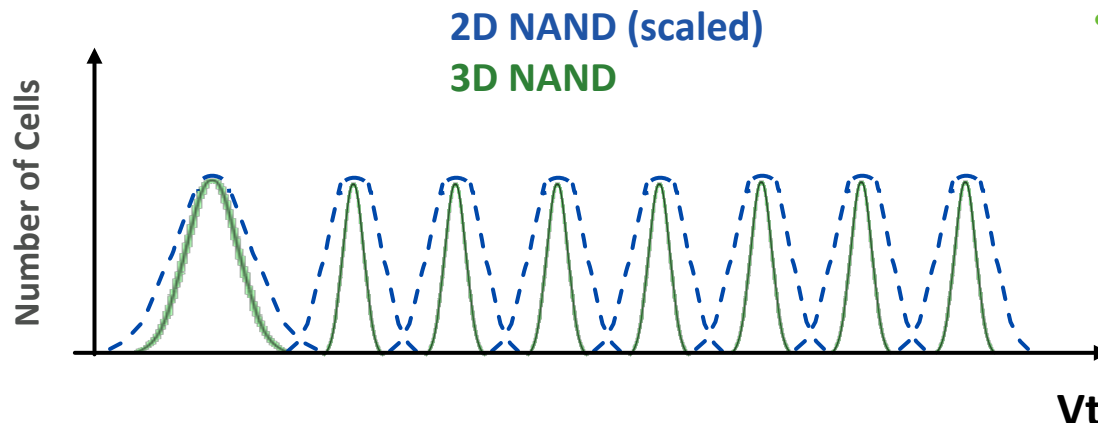


# 3D NAND Performance Relative to Planar NAND



3D NAND cell design simultaneously improves performance and reliability

- Vertical stacking allows large number of electrons per cell independent of scaling
- No longer relying on lithography to continue scaling
- Decreased interference between cells translates into higher cycling endurance

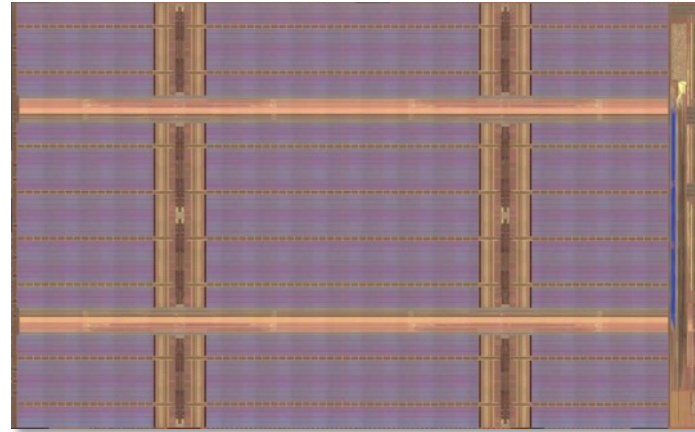




# Leadership in Future Memory Technologies

## Strategic investment in future memory **roadmap enablement**

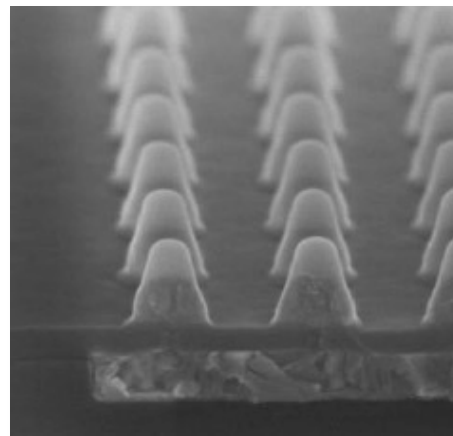
- DRAM or DRAM replacement scaling
- Storage class enablement
- Multiple generations of 3D NAND



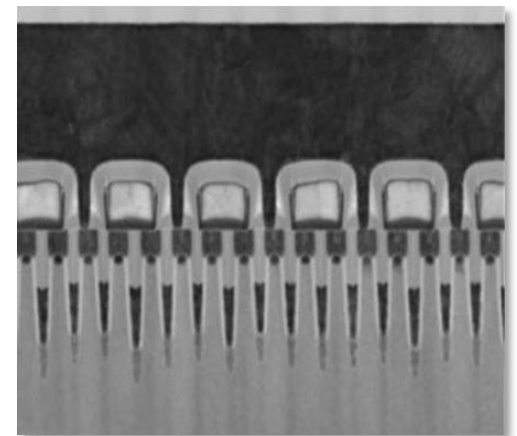
*16Gb High Speed Storage Class Memory*

## Strategic investment in future memory **core technologies**

- Resistive Random Access Memories (RRAM)
- Spin Torque Random Access Memories
- And others...

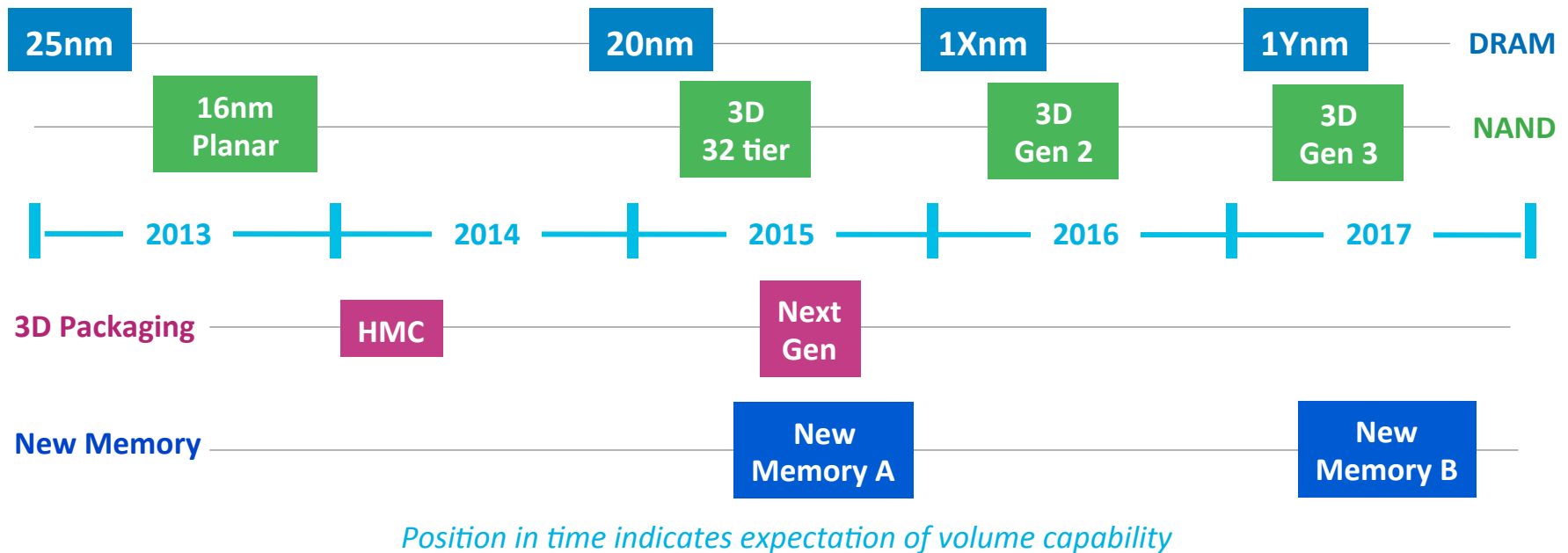


*STTRAM Array*



*Advanced 27nm RRAM Cell*

# Innovation Roadmap



- Increased focus on DRAM technology position driving faster introduction cadence
- Enable volume 3D NAND manufacturing capability through 2015
- 3D NAND packaging technology enablement for multiple differentiated opportunities
- Establish disruptive new memory technology and position for ramp in 2016



# Q&A



# Tom Eby

VP Compute and Networking Business Unit



# Compute & Networking

## Market Trends

### Graphics

Enhanced visualization experience driving higher memory bandwidth

Increased game console performance requiring increases in density



### Client

Ultrathin notebooks driving smaller form factors

Desire for ultimate mobility driving need for long battery life



### Networking

Ubiquitous connectivity driving networking innovations

Video and new subscribers driving bandwidth growth



### Enterprise & Cloud

Software defined architecture driving massively virtualized data center scalability

Real-time data analytics driving high capacity memory demand



## Integrated Innovation

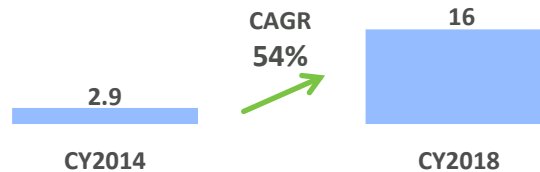
*Enabled by Micron Memory*

# Compute & Networking

## Memory Demand Drivers

1Gbe (M)

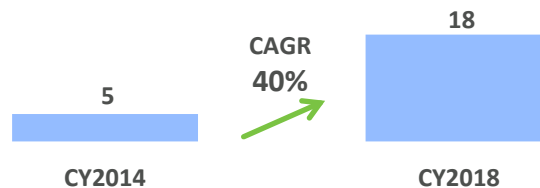
### Cloud



- Public cloud set to hit 47% of overall Server DRAM demand
- Massive growth in enterprise level cloud services (XaaS)

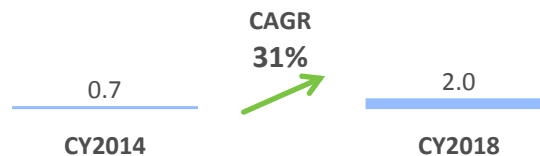


### Enterprise



- Real-time data analytics driving high density DRAM demand
- In-memory computing market space growing at > 45% CAGR

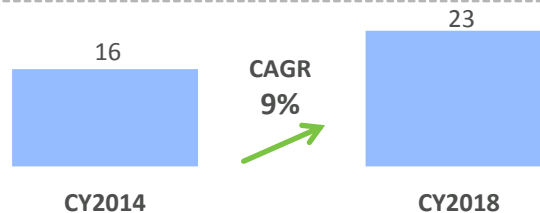
### Networking



- LTE build out in China
- Mobile data increase 11X from 2013 to 2015



### Client



- Highly concentrated OEM base with stable business
- Ultrathin driving growth (unit CAGR 42% / content CAGR 9%)



### Graphics



- GDDR5 growth lead by performance graphics segment
- Console performance driving higher DRAM content



Source: Micron and Industry Analysts; CAGR represents bit growth, CY2014-CY2018

# Micron as the Key to Customer Success

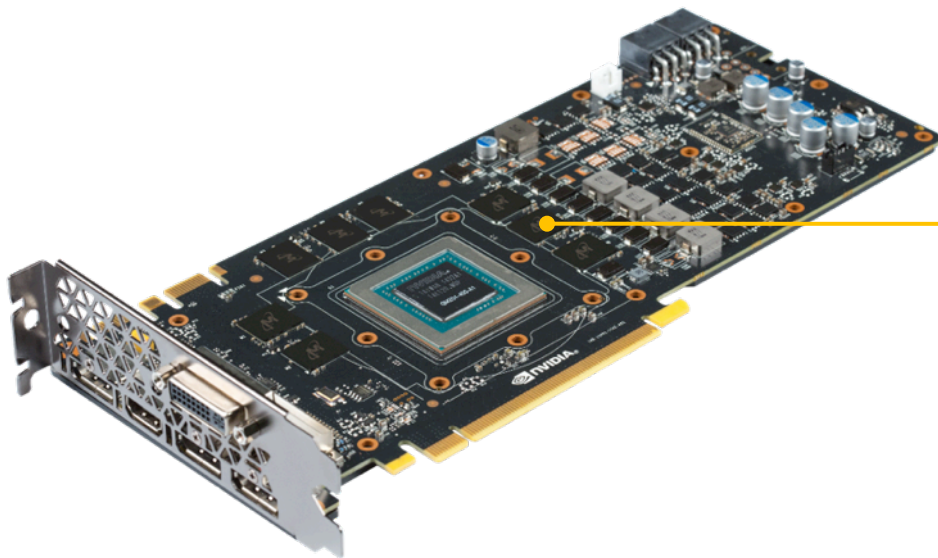
## Graphics

### Application Drivers

- ✓ UHD/4K resolutions
- ✓ Faster, more responsive gaming graphics
- ✓ CAD, 3D print for professional / corporate applications

### Micron Technology Enablers

- ✓ Extreme bandwidth product designs
- ✓ Packaging for thermal management
- ✓ Proprietary test technology for stability & endurance



### Micron Portfolio

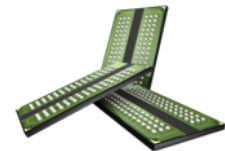
#### GDDR5

- Extreme bandwidth for a seamless graphics experience
- Density options to fit a variety of performance segments
- Speeds up to 8.0Gbps
- Customizing by application



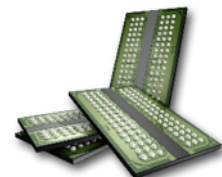
#### High-speed DDR3

- Standardized solution for graphics



#### Specialized Solutions

- Development efforts underway to increase bandwidth up to 15Gbps in a discrete component



# Micron as the Key to Customer Success

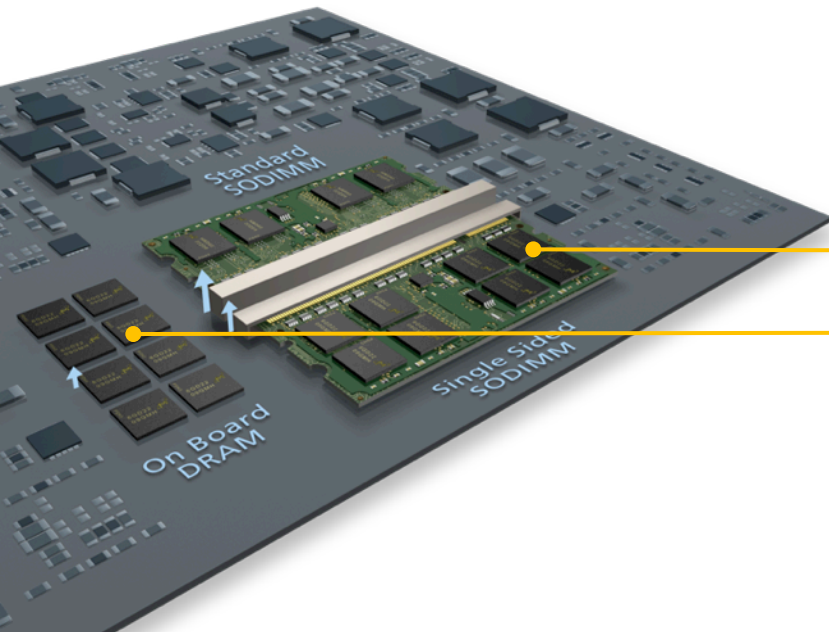
## Client

### Application Drivers

- ✓ Mobility and extended battery life
- ✓ Thin and light form factors
- ✓ Security requirements

### Micron Technology Enablers

- ✓ Performance and cost-optimized DRAM technology
- ✓ Packaging technologies for energy-efficient stacked DRAM
- ✓ Security for non-volatile solutions



### Micron Portfolio

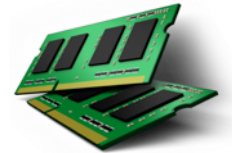
#### On-Board Memory

- Up to 16Gb per package
- Various package options
- Soldered-on-board for thin profile
- DDR3L and LPDDR3/4



#### Client Modules

- Up to 16GB density
- Thin form factor
- 1.35V DDR3L at 10% lower power than standard DDR3



#### Serial NOR

- Dependable BIOS
- Secure Boot





# Micron as the Key to Customer Success

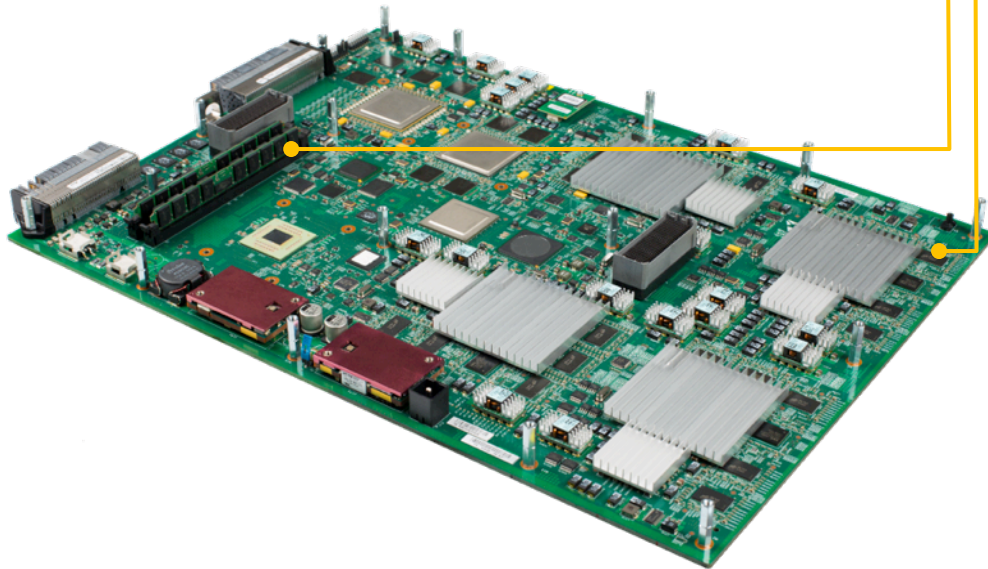
## Networking

### Application Drivers

- ✓ Video and new users driving insatiable bandwidth demand
- ✓ LTE worldwide roll-out
- ✓ Next generation ethernet IP connectivity

### Micron Technology Enablers

- ✓ High speed and abstracted interface capability
- ✓ Low latency solutions
- ✓ Through-Silicon Via (TSVs) and 3Di interconnect



### Micron Portfolio

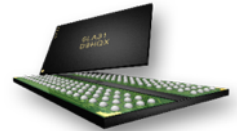
#### DRAM Modules

- Error correction for data integrity
- VLP and custom form factors
- Leading-edge and legacy options



#### RLDRAM

- Low latency
- Fast random access
- Specialized x9, x18, and x36 configurations



#### Hybrid Memory Cube

- Best-in-class bandwidth solution
- Provides the bandwidth of as many as 144 DDR3 components



#### eUSB

- Firmware and OS management
- User tracking data



# Micron as the Key to Customer Success

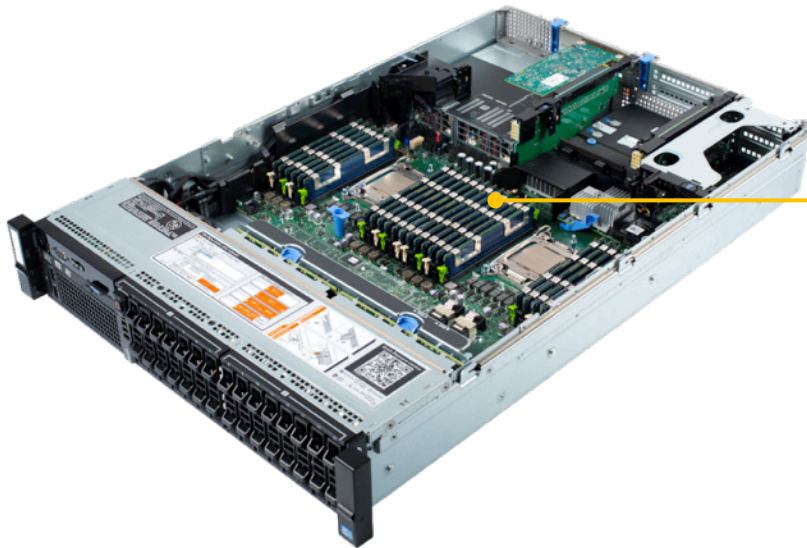
## Enterprise & Cloud

### Application Drivers

- ✓ Explosive growth in high capacity cloud infrastructure
- ✓ Workload proliferation using real time in-memory analytics
- ✓ TCO and uptime performance driven by economies of scale

### Micron Technology Enablers

- ✓ Enterprise-class 25nm and 20nm process
- ✓ High speed abstracted interface technology
- ✓ Through-Silicon Via (TSVs) and 3Di interconnect
- ✓ Non-volatile persistent memory systems



### Micron Portfolio

#### Server Modules

- Up to 128GB module densities
- DDR4 solutions driving 20% less power
- Load reduced capability for high density



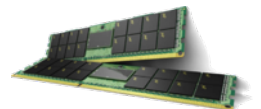
#### Hybrid Memory Cube

- Best-in-class bandwidth solution
- 70% less energy per bit
- Industry leading reliability



#### Specialized Solutions

- Ultra high density products
- Sub-system design services
- Advanced manufacturing support



#### Persistent Memory

- Integrated DRAM/NAND module
- Outstanding latency and bandwidth
- Excellent endurance capability



# Compute & Networking Business Unit

*Shaping the New Memory Landscape*

## Advanced Solutions

### Enable Future Memory Architectures

- Redefining system architectures
- Optimizing data movement

## Specialized Solutions


### Lead with High Value Products

- Portfolio differentiation
- Bringing memory closer to the CPU

## Core Memory Solutions

### World-Class Execution

- Manufacturing technology and scale
- Quality and service



# Q&A



# Jeff Bader

VP Embedded Business Unit

# Embedded

## Market Trends

### Automotive

Transition to a mobile living space; fully connected with autonomous driving

V2V/V2I communications

Accelerated adoption of new technologies



### Industrial Multi Market

Internet of Things (IoT) driving smarter and connected devices

Distributed data analytics and storage

Adoption of mobile and PC derived platforms



### Consumer

Adoption of UHD/4K expands across applications

Wearable applications are booming

Increased mobility and smaller form factors



### Connected Home

Smarter homes for entertainment, security and energy management

Traditional Set Top Box (STB) market faces competition from Over The Top (OTT) and cloud-based networks

Rapid growth into developing countries



## Embedded Innovation

*Enabled by Micron Memory*

# Embedded

## Memory Demand Drivers

2014-2018  
Bit growth rates

### Automotive

NVM CAGR  
39%

DRAM CAGR  
39%

- >4x data storage driven by 3D maps, digital dashboard, black boxes and multimedia
- DRAM driven by infotainment and multi-camera Advanced Driver Assistance Systems (ADAS)

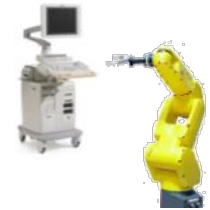


### Industrial

NVM CAGR  
27%

DRAM CAGR  
33%

- Smarter IoT devices drive 3x growth in code and data storage
- Real-time IoT performance, better HMI drives DRAM



### Consumer

NVM CAGR  
24%

DRAM CAGR  
37%

- 4K and smart devices drive code, application and data storage
- 4K drives 4x DRAM growth and bandwidth increases up to 60GB/s



### Connected Home

NVM CAGR  
27%

DRAM CAGR  
26%

- Cloud DVR, 4K and smart home IoT gateways driving flash
- Multi-room video and 4K drives DRAM bits and bandwidth growth



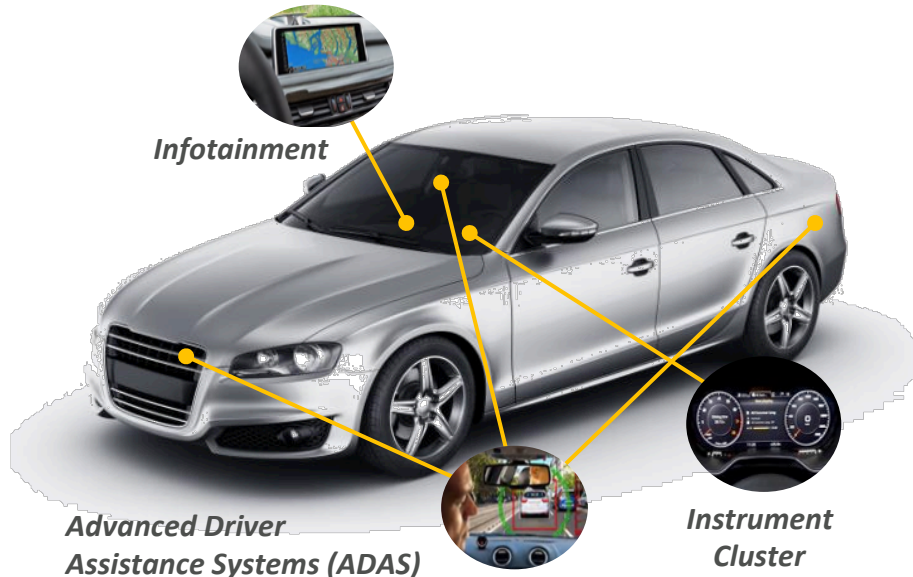


# Micron as the Key to Automotive Customer Success

## Automotive Customer Requirements

- ✓ Automotive quality, reliability and support
- ✓ Leading-edge technology
- ✓ Supply continuity and 10+ year longevity

*Every 100 hours Micron ships more Automotive bits than entire Automotive market consumed in 2000*



## Micron Strengths

### #1 in Automotive Solutions

- >2x market share of nearest competitor
- 25 years of automotive focus
- Full auto-grade Non-Volatile Memory (NVM) and DRAM

### Accelerating Adoption of Leading Edge Technology

- Leader in infotainment storage (8-320GB)
- High bandwidth compute with DDR3 & LPDDR4
- Quick follower of mainstream usage

### Enabling Innovation

- Car OEM, Tier1 and SoC enablement
- World-wide customer validation labs
- 10+ year availability with Product Longevity Program (PLP)

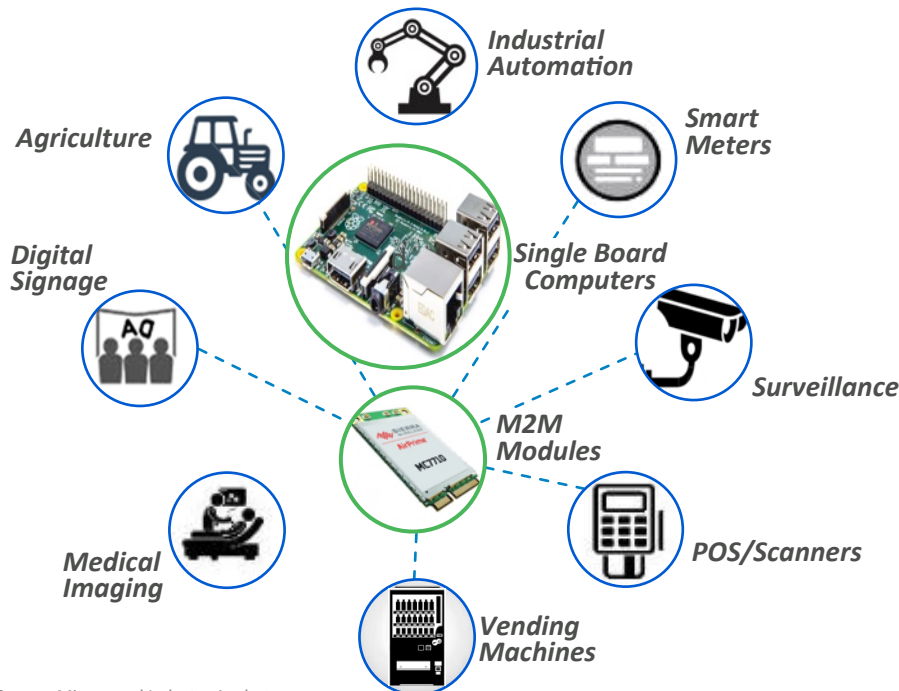


# Micron as the Key to Industrial Customer Success

## Industrial Customer Requirements

- ✓ High reliability at industrial temperatures
- ✓ Supply assurance and 5-10+ year longevity
- ✓ Full portfolio and form factor breadth

*IoT cellular M2M connections increase from  
<350M in 2013 to >2B in 2018*



## Micron Strengths

### Leader in Industrial Solutions

- Full portfolio of DRAM solutions
- High endurance SLC NAND and eMMC
- Instant-on boot performance from NOR

### Leadership for IoT Growth

- #1 in M2M cellular modules
- Broadest portfolio and smallest form factor industrial MCPs
- 2G/3G and LTE solutions

### Enable Highly Fragmented Market

- Industrial reference design focus
- Global distribution partnerships
- Micron Product Longevity Program (PLP)

# Micron as the Key to Consumer & Connected Home Success

## Consumer & Connected Home Requirements

- ✓ Rapid time to market
- ✓ Early adoption of new technology
- ✓ High volume customized solutions

*By 2016, **70%** of the world TVs will be **smart TVs** and **40%** will be **4K/UHD***



## Micron Strengths

### Leading Edge Technology and Manufacturing Scale

- Focused ecosystem enablement
- World-wide customer validation labs
- Supply capacity for new product ramps

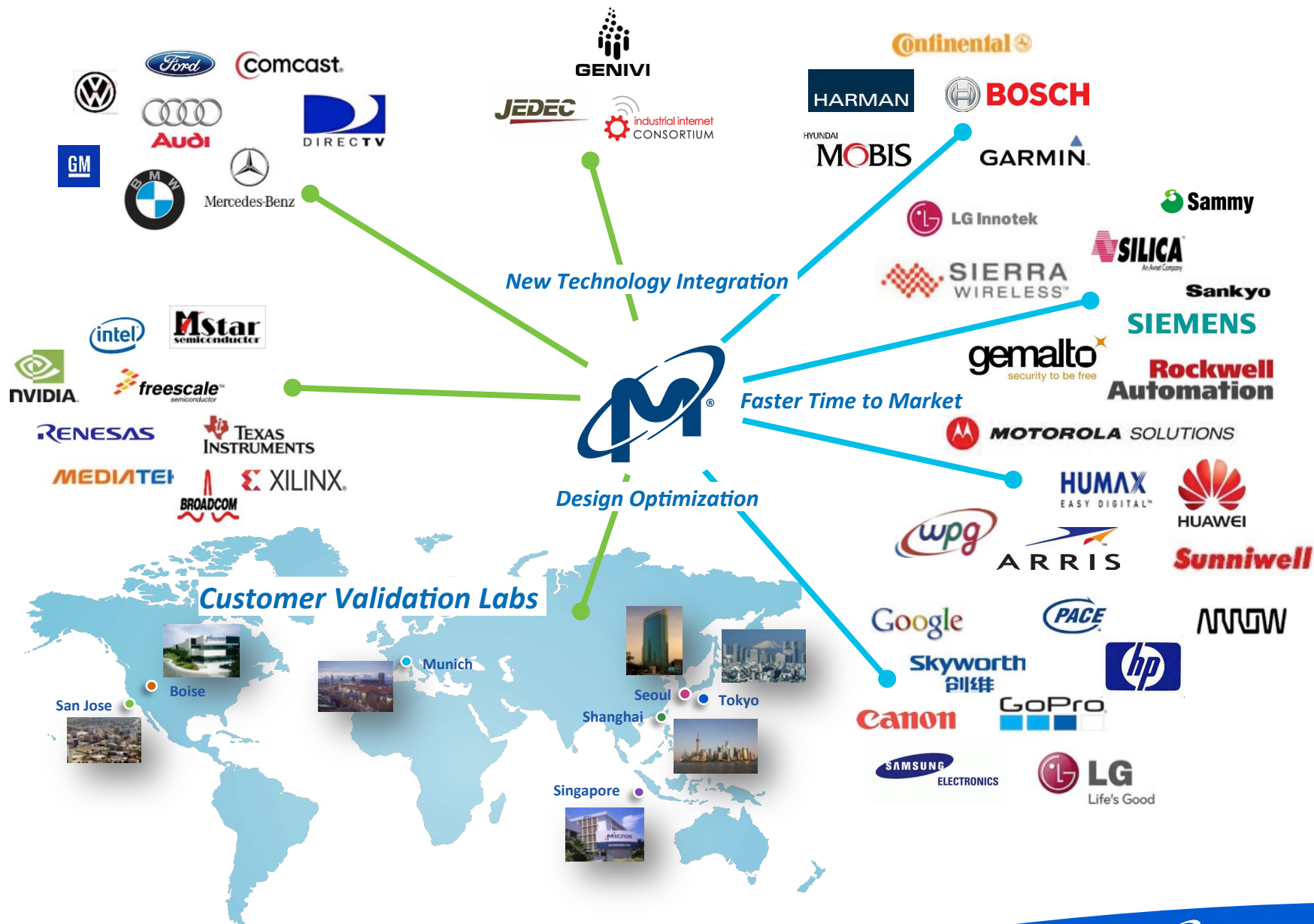
### Broadest Product Portfolio for Expansive Applications


- Serial NOR to high density eMMC
- Legacy SDRAM to LPDDR4
- Chip-scale to multi-chip packages

### Differentiated Solutions for Cost Optimization and Innovation

- Customized small form factors
- Optimized hardware plus software solutions

# Broad Enablement for Accelerating Innovation





# Q&A



# ***Conference Break***



# Darren Thomas

VP Storage Business Unit



# Storage

## SSD Market Trends

### Enterprise

Driving much larger flash consumption via high-performance all-flash arrays and storage solutions

Continued focus on reliable, fault tolerant solutions and 24/7 architectures

All active data moving to flash, inactive data going to cloud



CAGR:  
53%

### Data Center

Dynamic move toward open platforms utilizing flash in unique ways

Renewed focus on read-centric, high capacity, replicated platforms

Flash enabling lights-out data centers



CAGR:  
55%

### Client

Continued innovation around thin and light notebook designs, HDD being designed out

Corporations driving design for battery life, performance and encryption

Costs near tipping point



CAGR:  
54%

### Consumer

Flash providing cost-effective way to replace hard drive; easy notebook upgrade

Gaming and enthusiasts continued drive for performance and features

Adoption has reached mainstream consumers; advantages are becoming realized



CAGR:  
24%

## Storage Innovation

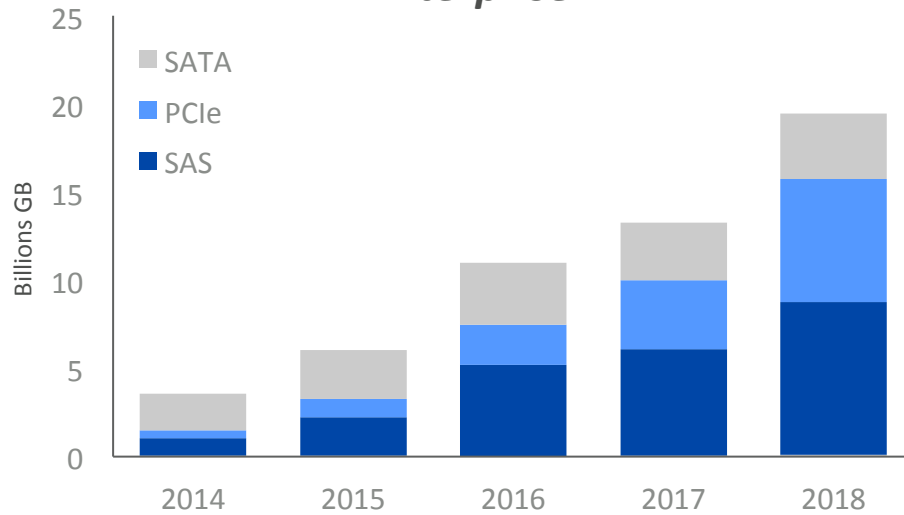
*Enabled by Micron Flash*

Source: Micron and Industry Analysts; CAGRs represent bit growth, 2014-2018

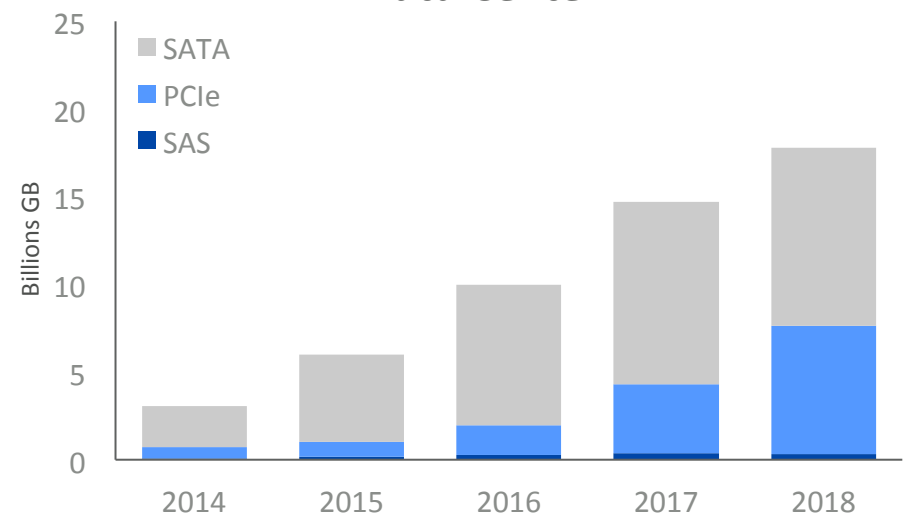
# Demand Trends

*Gigabytes*

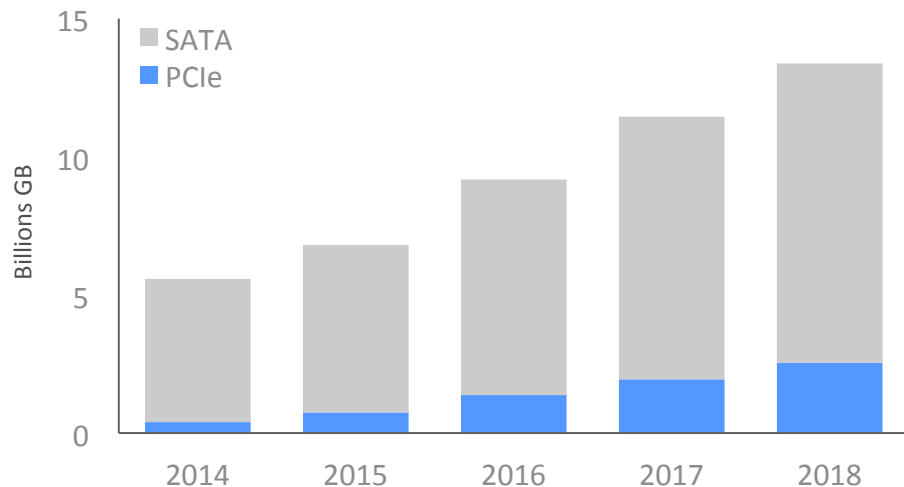
**Enterprise**



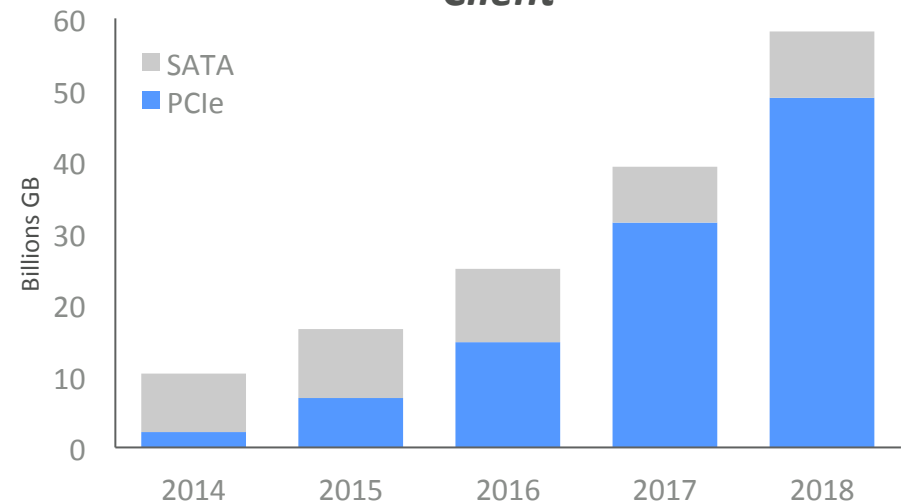
**Data Center**



**Consumer**



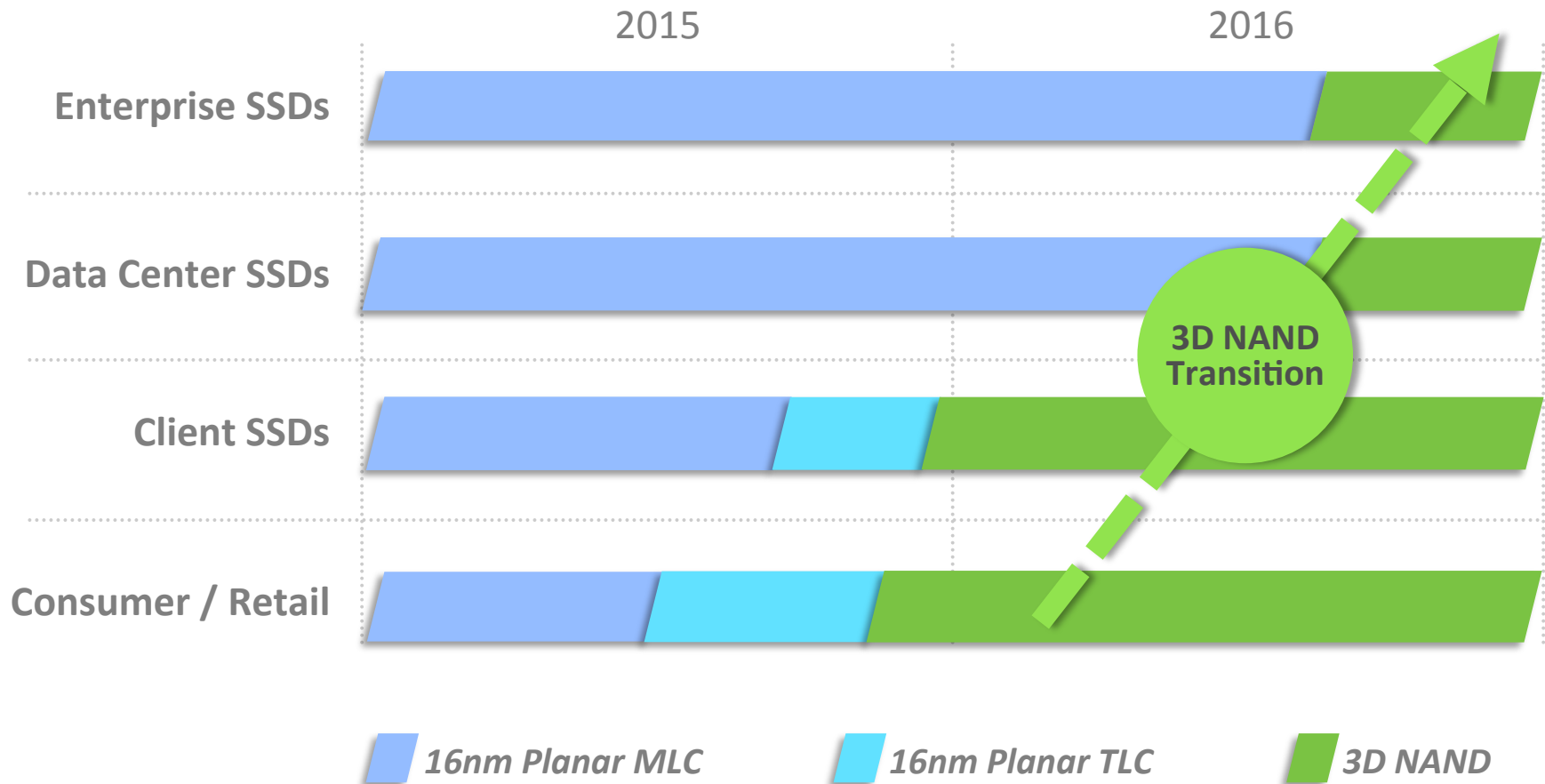
**Client**



Source: Micron and Industry Analysts

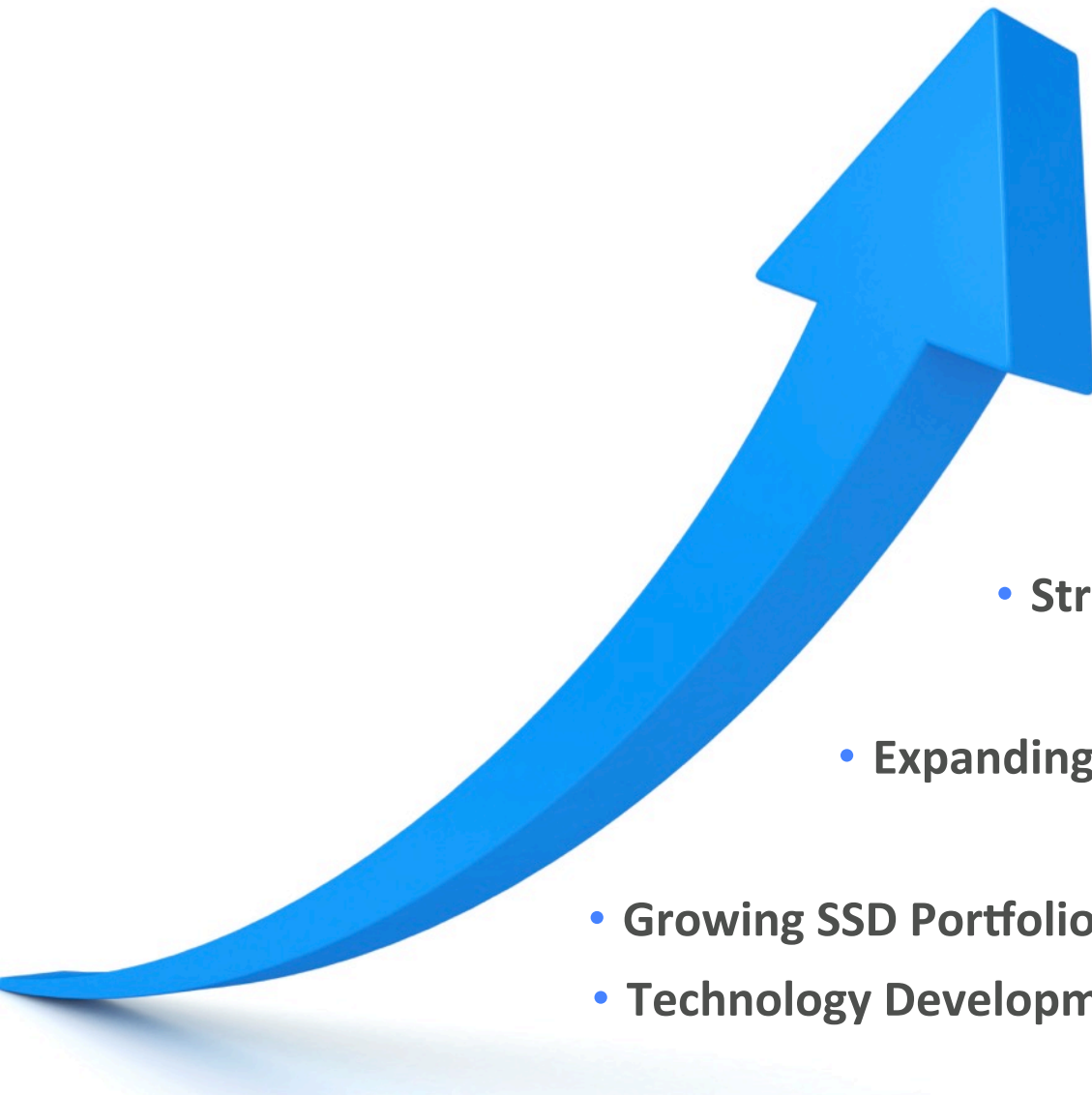


# Technology Deployment



# Strategic Trajectory

*Redefining the Future of Storage*



- Software
- Next Generation Memories
- 3D NAND
- Strategic Partnerships
- Expanding Enterprise Storage Capabilities
- Growing SSD Portfolio
- Technology Development

# Micron & Seagate

- Multi-year strategic agreement
- Combines the innovation and technical expertise of two industry giants
- Initial collaboration: Enterprise SAS SSD
- Strategic supply of NAND for Seagate
- Access to SAS drive technology for Micron
- Establishes framework for future strategic collaboration on enterprise NAND Flash-based storage technologies



# Micron Storage

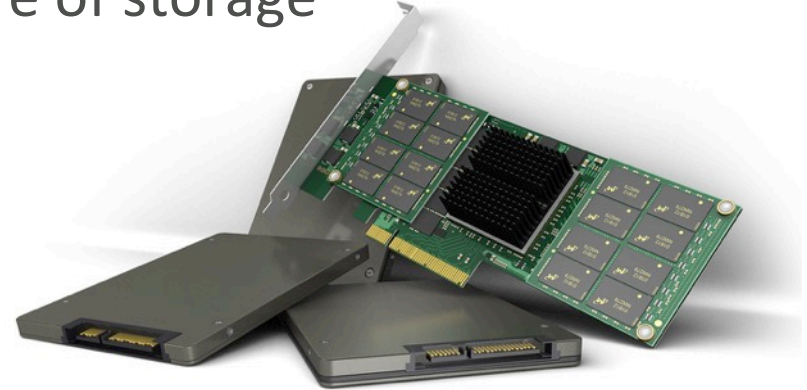
*Building* a world-class team


*Innovating* with our technology

*Partnering* with enterprise leaders


*Engaging* with the end-user customers

*Redefining* the future of storage





# Q&A





# Mike Rayfield

VP Mobile Business Unit

# Mobile

## Market Segments

### High/Mid-End Smartphones

4G connectivity and ecosystem drives higher memory consumption

Increasing camera resolution and display pixel density



### Value Smartphones

Android One increases system requirements in low-end products

OEMs competing on specs and price



### Tablets

Media storage/playback and productivity apps drive high memory density

Increased display pixel density and longer replacement cycle



### Smart Watches

Smartphone connectivity requires fast and power-efficient memory

Small device size limits battery capacity



## Integrated Innovation

*Enabled by Micron Memory*

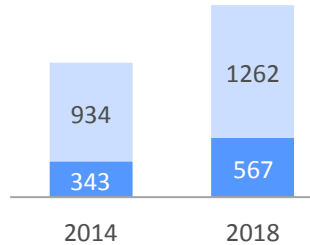
# Mobile

## Memory Demand Drivers

### High/Mid-End Smartphones

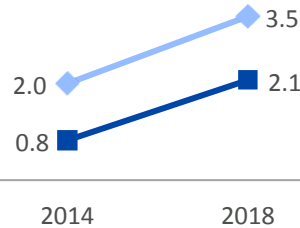
Millions of Units

■ Value ■ High/Mid



Average DRAM GB/sys

—◆— High —■— Value



- High/mid-end segment consuming high-density memories
- Driving requirements for high-performance memory



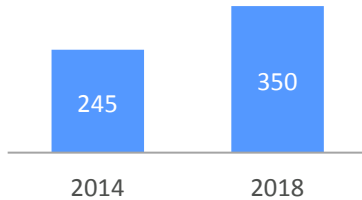
### Value Smartphones

- Value devices raising minimum memory requirements
- Large volume of devices and higher density requirements

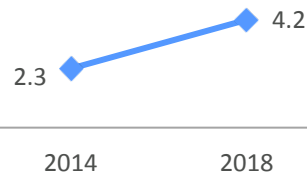


### Tablets

Millions of Units



Average DRAM GB/sys

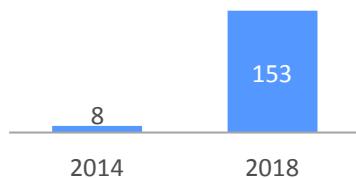


- High density memory requirements for media storage
- Lower consumer replace cycle than smartphone

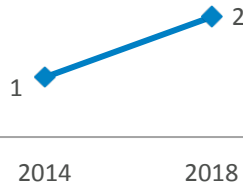


### Smart Watches

Millions of Units



Average DRAM GB/sys



- Fastest Y/Y growth potential
- Indicative of evolving smartphone ecosystem

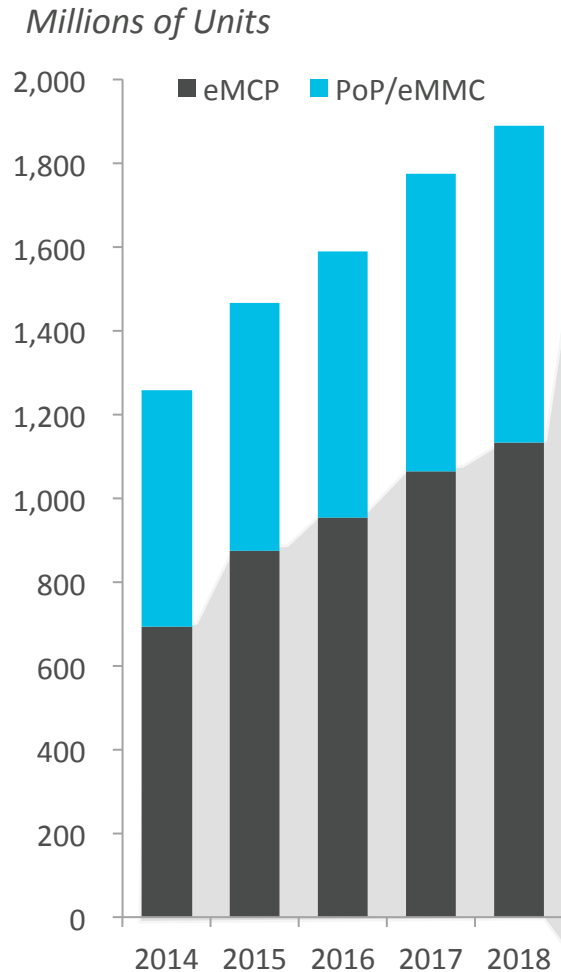


Source: Micron and Industry Analysts



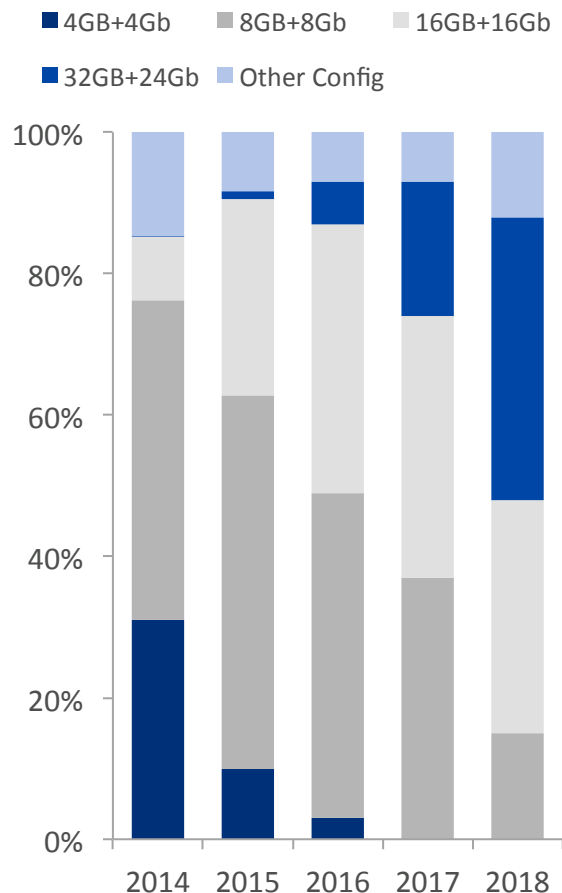
# Mobile Memory Trending Towards eMCP

## Memory Market Data



Source: Micron and Industry Analysts

## Mix of eMCP density (%)



## Micron Strengths

- Mobile NAND growth requires LPDRAM strategy
- eMCP expected to remain ~60% of overall smartphone due to easier design, procurement, and manufacturing
- Comprehensive portfolio of density to meet all smart phone segments
- Innovative packaging capability as system requirements continue to stress performance and low-power needs

# Micron as the Key to Customer Success

*Focus on Smartphones and Tablets*

## Customer Requirements

- ✓ Smartphone/tablet similar system architecture
- ✓ Advanced system core processor
- ✓ High-def video and high-density cameras
- ✓ Battery life and user experience



## Micron Portfolio

### 4-32Gb LPDDR4

- Multiple package options
- 4x provides 4GB density
- LPDDR4 2x bandwidth LPDDR3
- LPDDR4 35% power savings over LPDDR3



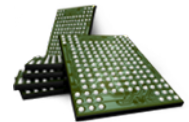
### eMMC 5.x

- Small package options
- 3x random Read/Write performance
- 2x sequential Read/Write performance
- Wide temperature range tolerance and high reliability



### eMCP + LPDDR3

- Attractive package/density options
- 2x bandwidth over eMCP+LP2
- Quick time-to-market for system qualification efforts



# Micron as the Key to Customer Success

## *Focus on Smart Watches*

### Customer Requirements

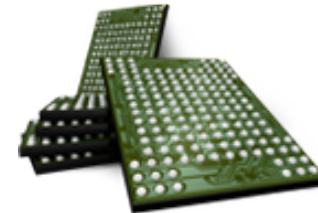
- ✓ Extreme low power
- ✓ High durability (shock/vibration)
- ✓ High speed performance (wake up times)



### Micron Portfolio

#### ePoP

- From 12x12mm to 10x10mm
- Reduced package z-height
- Integrated with LPDDR2/3 to cope with different performance requirements
- Customized form factor, interface, configuration possible for system optimization



# Leveraging Global Mobile Market Dynamics

## *Distributed Market: 2016+*



# Memory Enabling Mobile Innovation

## Micron Portfolio

- Performance optimization with power efficiency
- Packaging innovation – evolving form factor
- Fast time-to-market for both LPDRAM and NAND





# Q&A

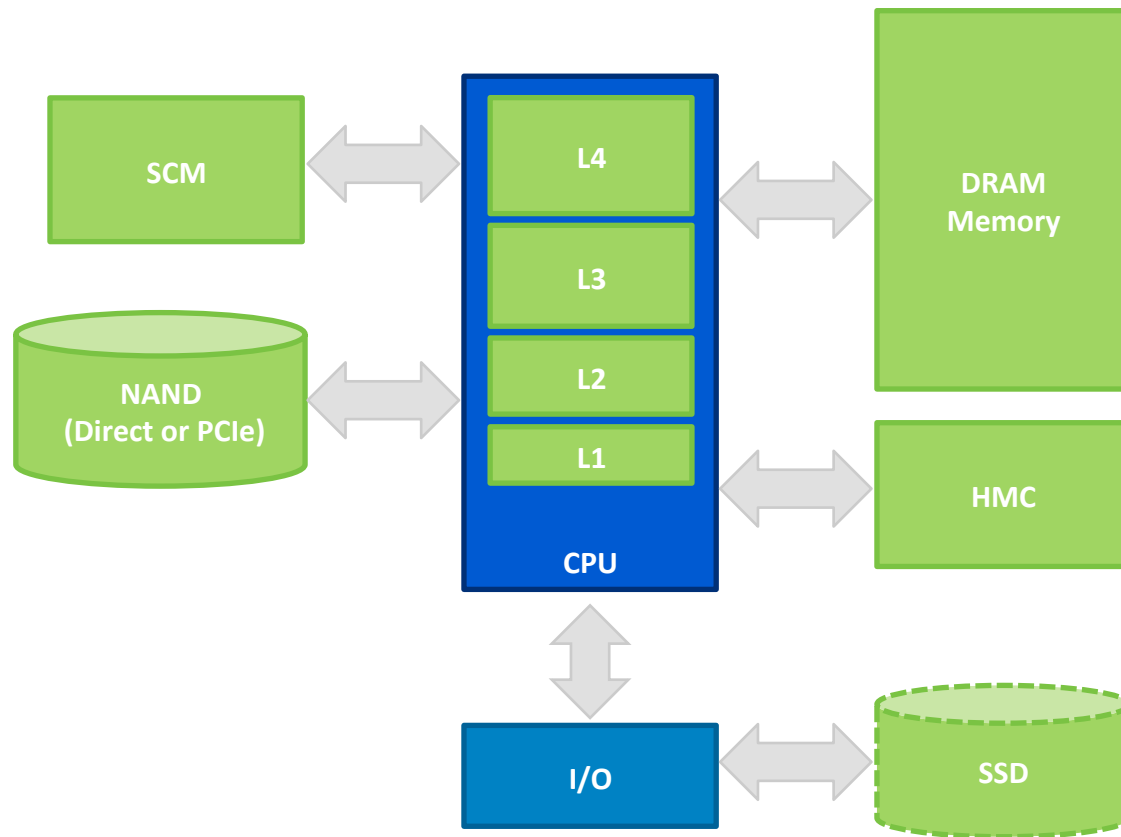


# Brian Shirley

VP Memory Technology & Solutions

# The Future of Memory Innovation

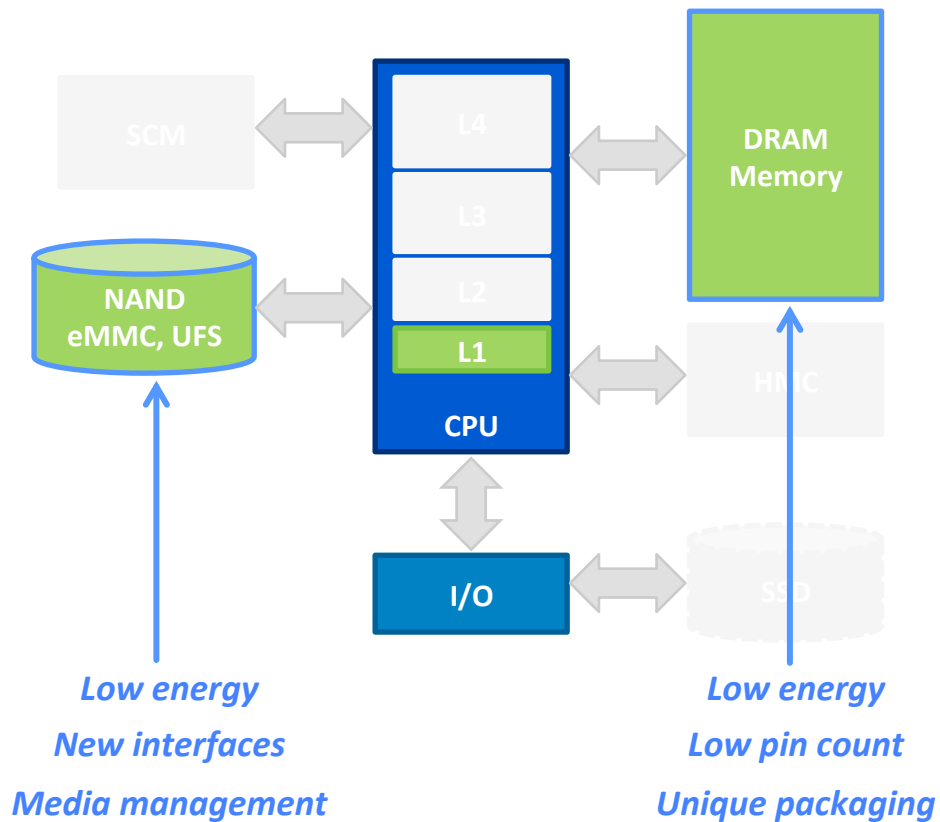
## *Computing Architecture of Today & Tomorrow*





# The Future of Memory Innovation

## Computing Architecture of Today & Tomorrow

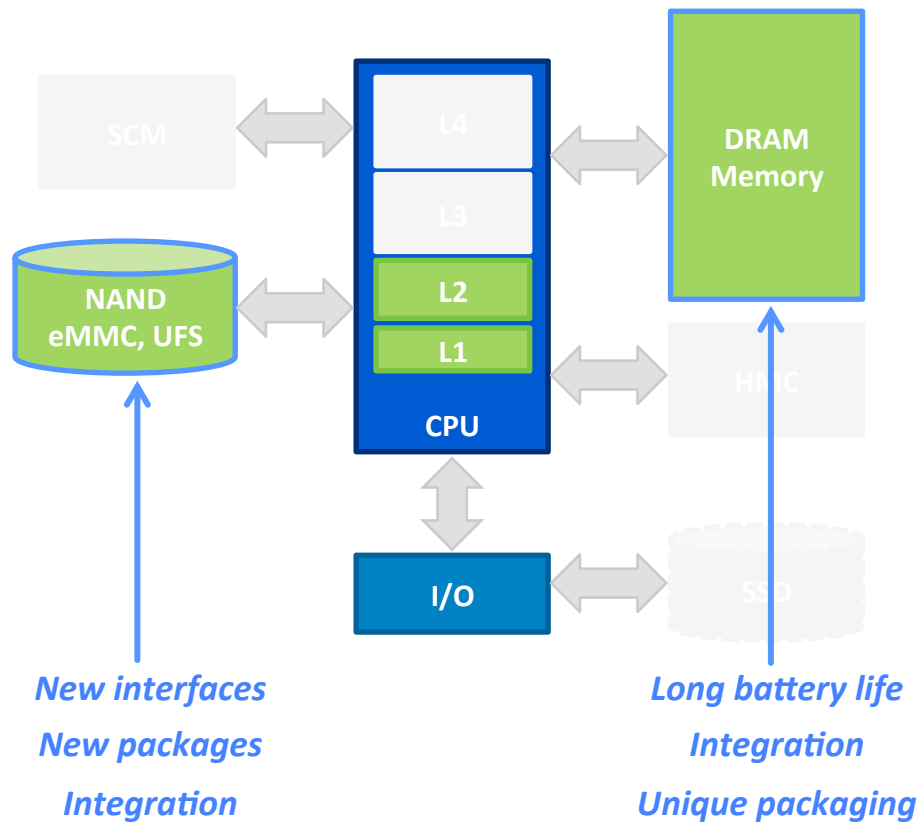


## Key Drivers

**Internet of Things** driving a need for ease of system integration, lower power consumption, and unique form factors

# The Future of Memory Innovation

## Computing Architecture of Today & Tomorrow



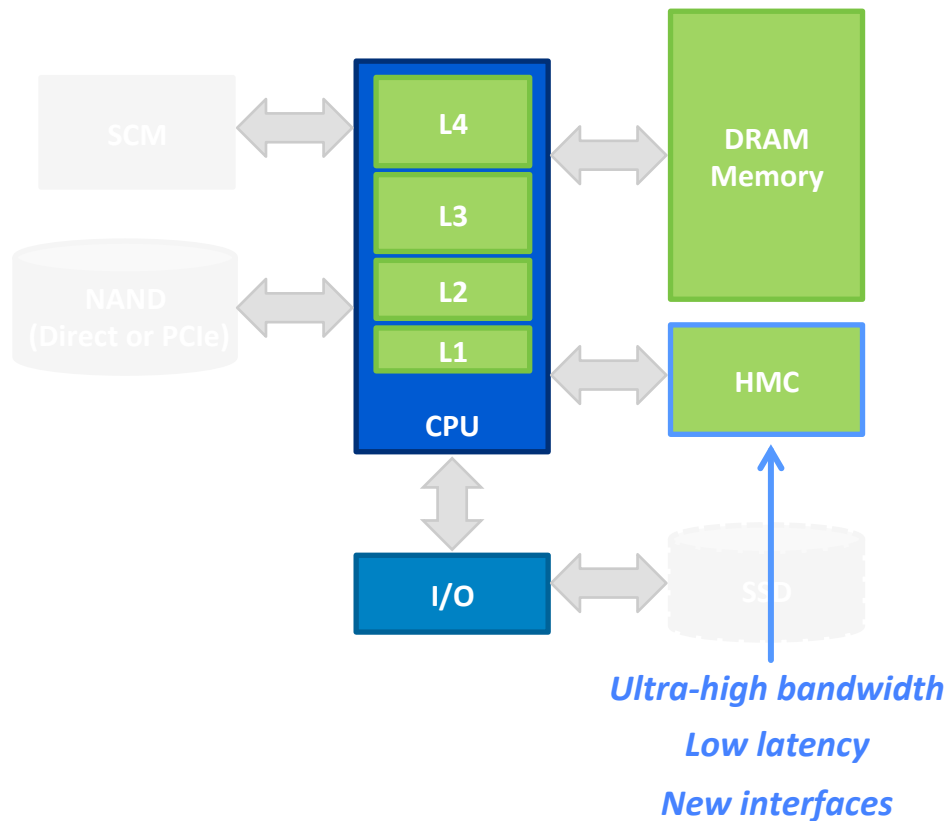
## Key Drivers

**Internet of Things** driving a need for ease of system integration, lower power consumption, and unique form factors

**Mobility** driving a need for lower power, smaller form-factors, and increased memory & storage density

# The Future of Memory Innovation

## Computing Architecture of Today & Tomorrow



## Key Drivers

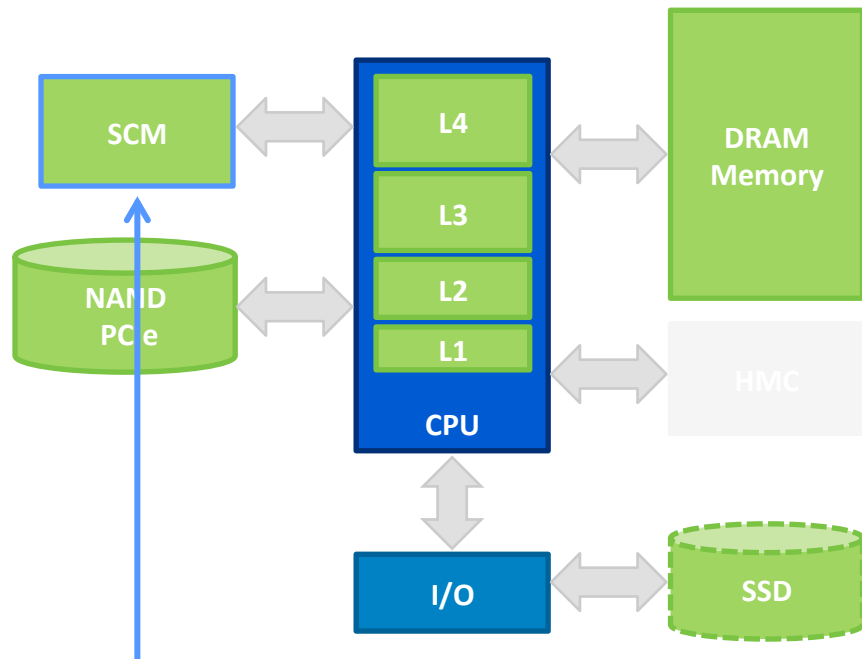
**Internet of Things** driving a need for ease of system integration, lower power consumption, and unique form factors

**Mobility** driving a need for lower power, smaller form-factors, and increased memory & storage density

**Networking** next-gen connectivity driving a need for faster data plane and control plane architectures

# The Future of Memory Innovation

## Computing Architecture of Today & Tomorrow



*New interfaces*

*Achieving low latency*

*Media management*

## Key Drivers

**Internet of Things** driving a need for ease of system integration, lower power consumption, and unique form factors

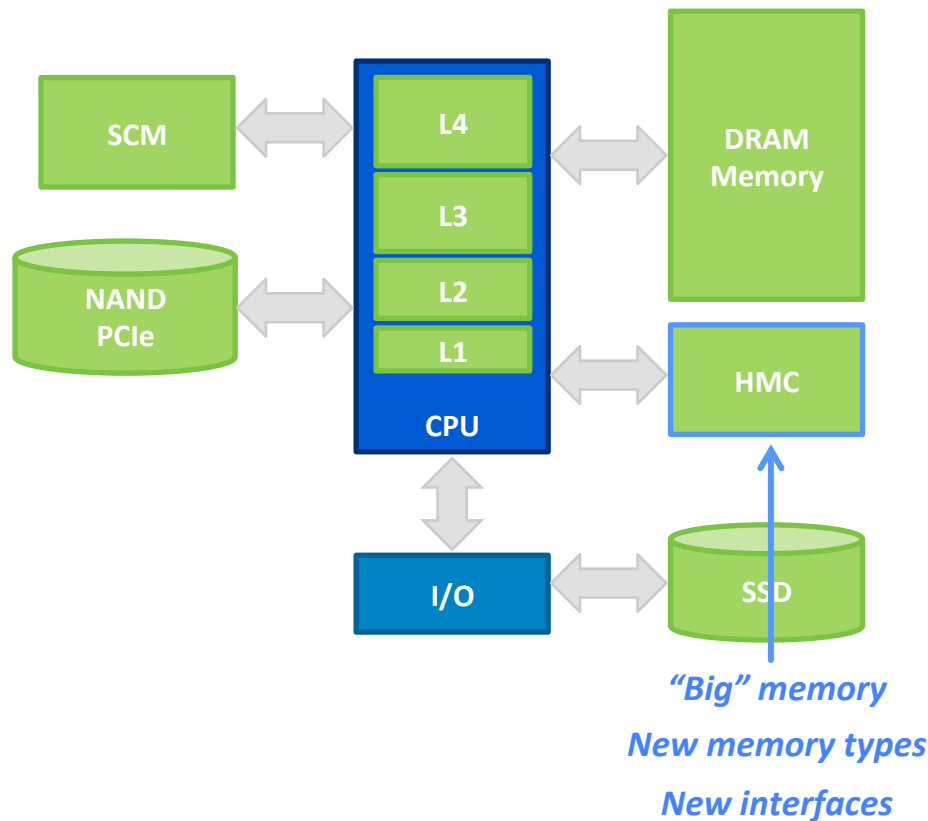
**Mobility** driving a need for lower power, smaller form-factors, and increased memory & storage density

**Networking** next-gen connectivity driving a need for faster data plane and control plane architectures

**Cloud Computing** driving software defined datacenter architectures leading to a larger memory footprint and fast storage retrieval

# The Future of Memory Innovation

## Computing Architecture of Today & Tomorrow



## Key Drivers

**Internet of Things** driving a need for ease of system integration, lower power consumption, and unique form factors

**Mobility** driving a need for lower power, smaller form-factors, and increased memory & storage density

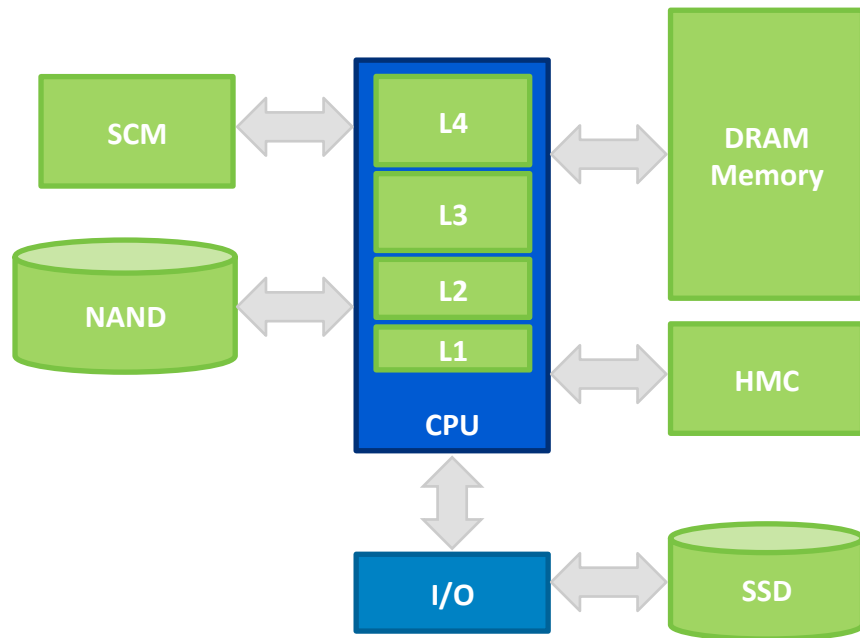
**Networking** next-gen connectivity driving a need for faster data plane and control plane architectures

**Cloud Computing** driving software defined datacenter architectures leading to a larger memory footprint and fast storage retrieval

**HPC/Big Data** applications driving need for real-time analytics based on in-memory computing platforms

# The Future of Memory Innovation

## Computing Architecture of Today & Tomorrow



## Memory drives solutions in all emerging applications

- New interfaces allow improved memory performance
- NAND adoption continues with improved integration
- Emerging memory types change the architecture

## Key Drivers

**Internet of Things** driving a need for ease of system integration, lower power consumption, and unique form factors

**Mobility** driving a need for lower power, smaller form-factors, and increased memory & storage density

**Networking** next-gen connectivity driving a need for faster data plane and control plane architectures

**Cloud Computing** driving software defined datacenter architectures leading to a larger memory footprint and fast storage retrieval

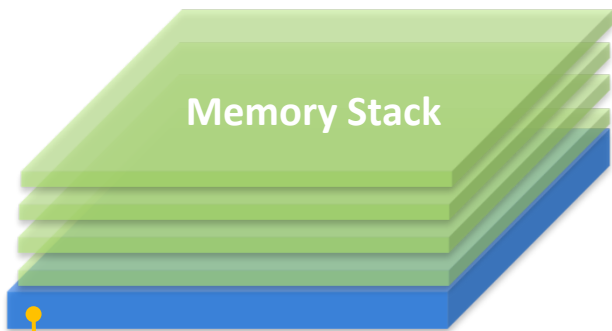
**HPC/Big Data** applications driving need for real-time analytics based on in-memory computing platforms

# In-Package Memory

**Bandwidth**

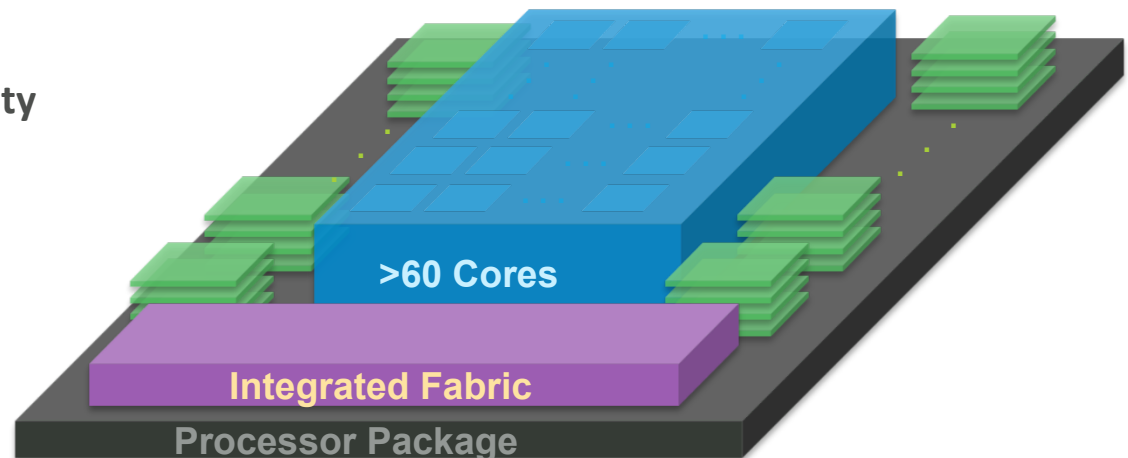
**Efficiency**

**Form Factor**



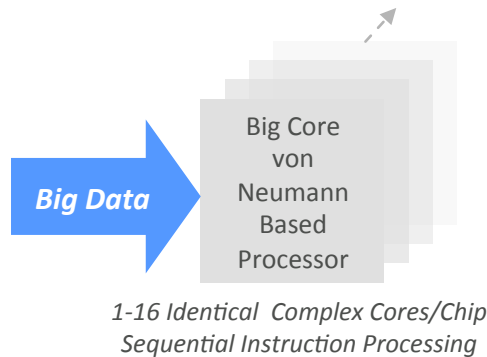
Controller / SoC Functionality

- Unprecedented memory bandwidth keeps pace with multiple CPU cores
- Increased savings in energy/bit
- TSV technology with logic layer allows roadmap to higher performance and lower energy



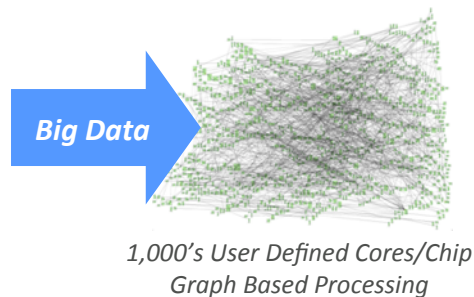
# Micron Automata Processor

## Moving Beyond Conventional



### Conventional Processing:

- Limited parallelism
- Complex parallel programming
- Constrained computational pipeline
- Expensive scaling
- Data conforms to core processor



### Automata Processing:

- Very high parallelism
- Simplified parallel programming
- Distributed computational pipeline
- Cost effective scaling
- User defined cores conform to data



### Bioinformatics:

- Large operands
- Complex patterns
- Unstructured data



### Financial Services:

- Highly parallel
- Real-time results
- Unstructured data



### Video Analytics:

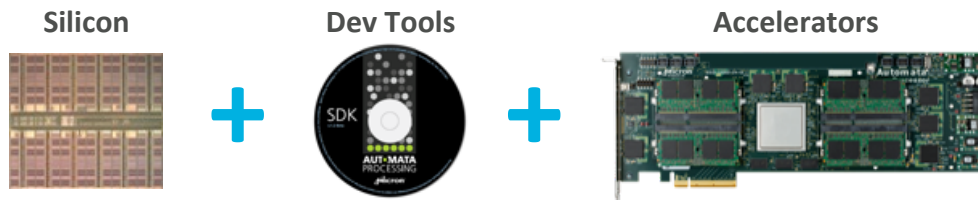
- Highly parallel operation
- Real-time results
- Unstructured data



### Network Security:

- Millions of patterns
- Real-time results
- Unstructured data

## Micron Developed Chip to System Solution

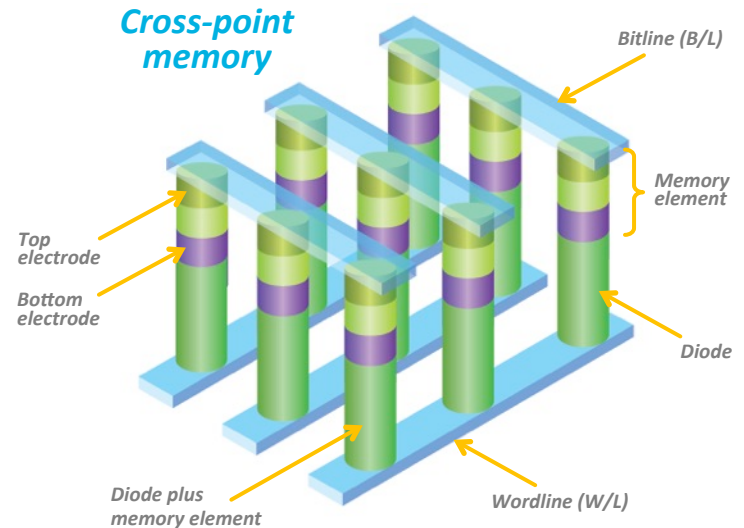
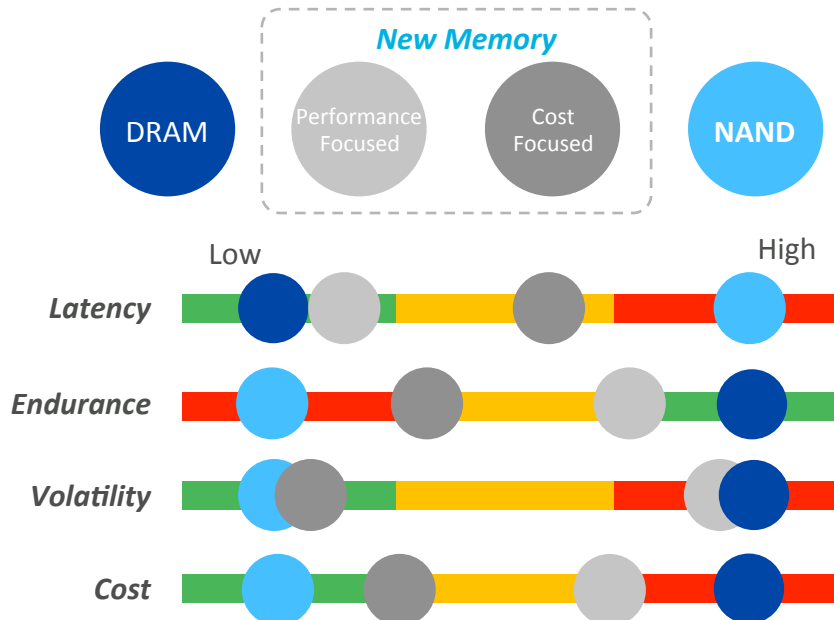




# Storage Class Memory

## Value Proposition

- DRAM-like performance with higher density and lower energy
- Non-volatility with fraction of DRAM cost/bit
- Ideal for large memory systems such as in-memory-database/in-memory-compute

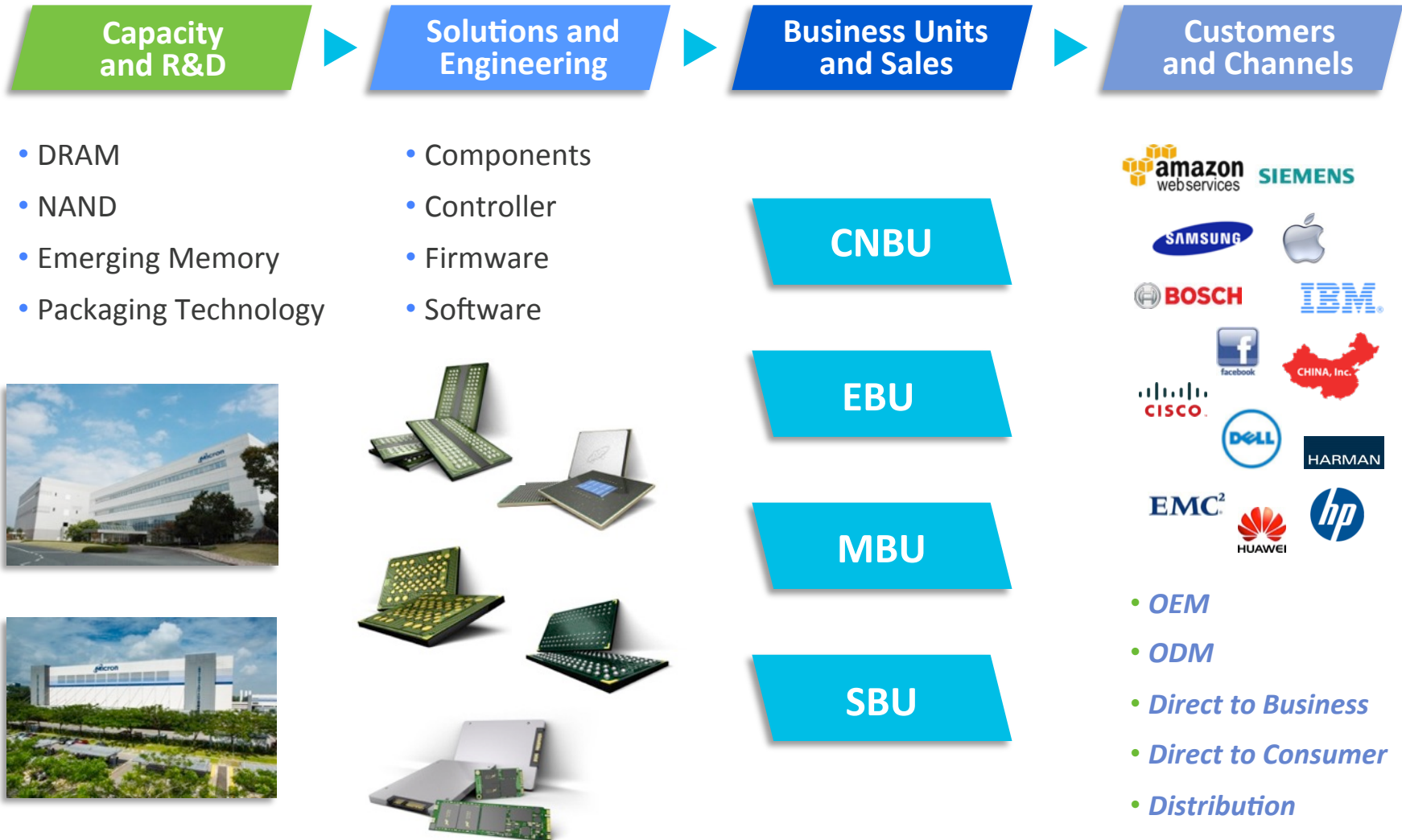


## Next Steps

- Multiple technologies currently in development and showing promise
- Controller technology is critical to exploit characteristics of each type of memory
- Software capable of taking advantage of the persistent memory semantics


# Micron Business Units

## *Capabilities for Markets' Critical Needs*





# Q&A





# Mark Durcan

CEO

# Strong Financial Performance

## Micron Performance

	FQ1-15	LTM <sup>1</sup>
Revenue	\$4,573	\$16,889
<b>Key Metrics<sup>(1)(2)</sup></b>	<b>Percent of Revenue</b>	
<b>Gross Margin</b>	<b>36%</b>	<b>34%</b>
SG&A and R&D	12%	13%
Tax Expense	2%	1%
<b>Net Income attributable to Micron</b>	<b>22%</b>	<b>22%</b>
<b>Net Income attributable to Micron (Non-GAAP)<sup>(3)</sup></b>	<b>25%</b>	<b>24%</b>
<b>ROA<sup>(4)</sup></b>	<b>18%</b>	<b>17%</b>
<b>ROA (Non-GAAP)<sup>(4)(5)</sup></b>	<b>28%</b>	<b>26%</b>

## Drivers

- Diversified market segments, products, and customers
- Return-focused technology and capacity deployment
- Value-added products and solutions
- Beneficial partnerships

1. LTM numbers are based on our historical results for the last 3 quarters of FY 2014 and the fourteen-week quarter ended December 4, 2014.

2. Gross Margin, SG&A, R&D, Tax Expense are based on GAAP figures.

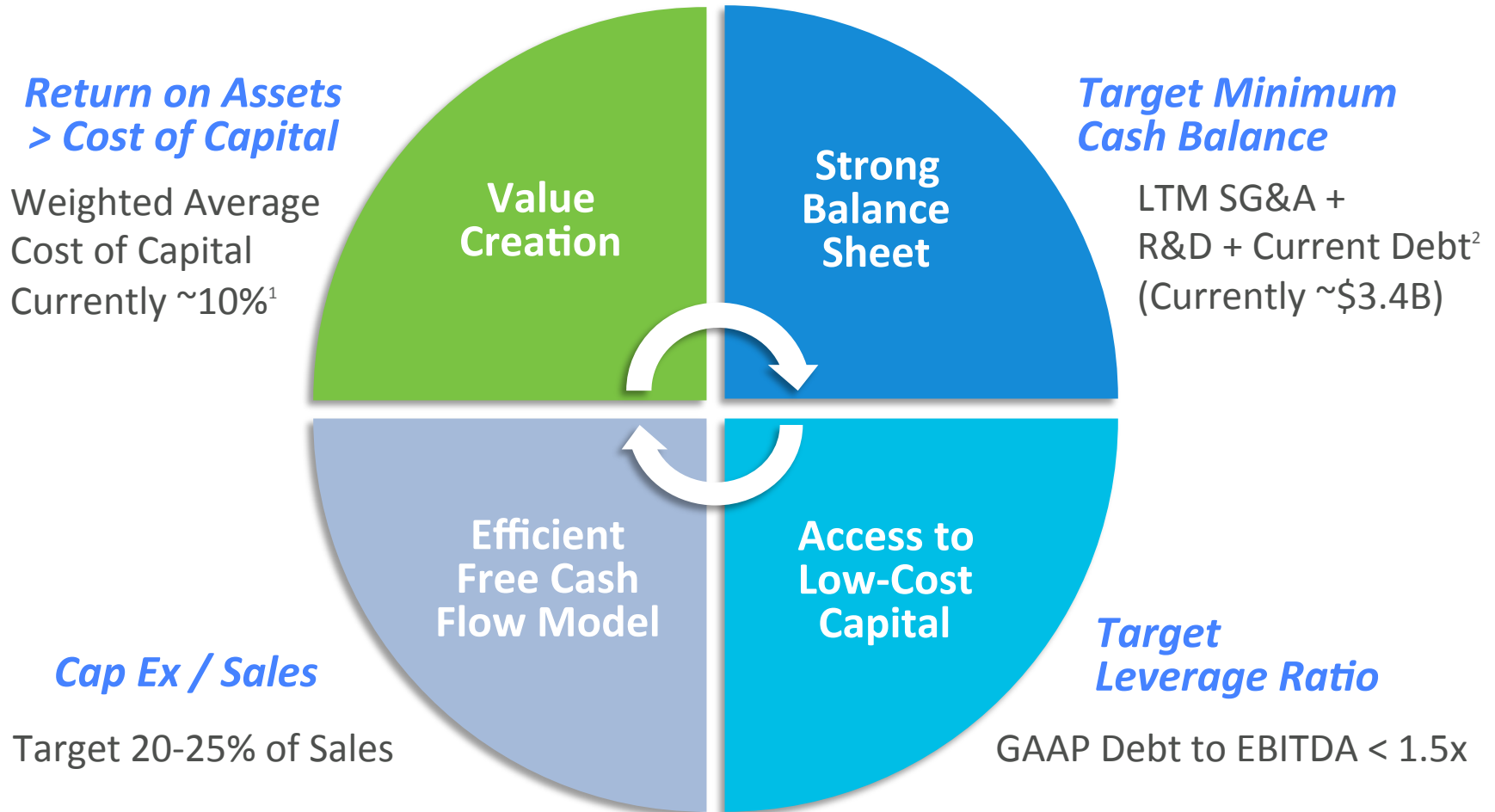
3. See reconciliation on slide 77

4. Annualized FQ1-15 values are based on FQ1-15 figures multiplied by 4. See reconciliations on slides 77 and 78

5. Non-GAAP ROA calculated using Non-GAAP Net Income and Total Assets adjusted for Non-controlling Interest in Assets and ST/LT Cash, Marketable Investments, and Restricted Cash.

# Capital Management

## Long-term Targets



1. Weighted average cost of capital as of December 4, 2014.

2. LTM SG&A and R&D = \$2.2B; Current Debt (based on GAAP value, not principal amount) = \$1.2B.

# Capital Management Execution

*We continue to make significant progress across our long-term targets*

## Return-Based Value Creation

- LTM Non-GAAP ROA<sup>1</sup> of ~26%
- LTM capital expenditures to sales of ~19%

## Target Capital Structure

- LTM Debt to Adjusted EBITDA<sup>2</sup> of ~1.1x
- Cash and marketable securities<sup>3</sup> of ~\$6.3B
- Upgraded credit rating in FY 2014

## Return of Capital

- \$2.8B used for dilution management (convertible notes) over the last 15 months
- \$1B common stock repurchase authorization with ~\$200M completed quarter to date<sup>4</sup>
- ~111M shares (~9%) reduced by dilution management<sup>5</sup>

***#1 Total Shareholder Return in S&P 500 over the last 2 years<sup>6</sup>***

1. LTM Non-GAAP ROA calculated using Non-GAAP Net Income and Total Assets adjusted for Non-controlling Interest in Assets and ST/LT Cash, Marketable Investments, and Restricted Cash. See reconciliation on slides 77 and 78  
2. LTM Debt to Adjusted EBITDA is the ratio of the GAAP carrying value of debt as of December 4, 2014 including the January high yield note issuance over LTM Adjusted EBITDA. See reconciliation on slide 76  
3. FQ1-15 cash includes proceeds from the January high yield note issuance.  
4. As of February 11, 2015  
5. Based on a \$32 share price with shares outstanding as of quarter ended December 4, 2014  
6. Based on Bloomberg Total Shareholder Return ranking, CY 2013 - CY 2014.

# Inotera Supply Agreement - Update

## Current

- CY 2015 to remain status quo
- Wafers purchased at discount to Micron's market ASP with discount adjusted based on Inotera's EBITDA

## Updated

- CY 2016 and beyond to adopt a margin sharing agreement
- Equal margin sharing represents a more balanced risk/return for both parties

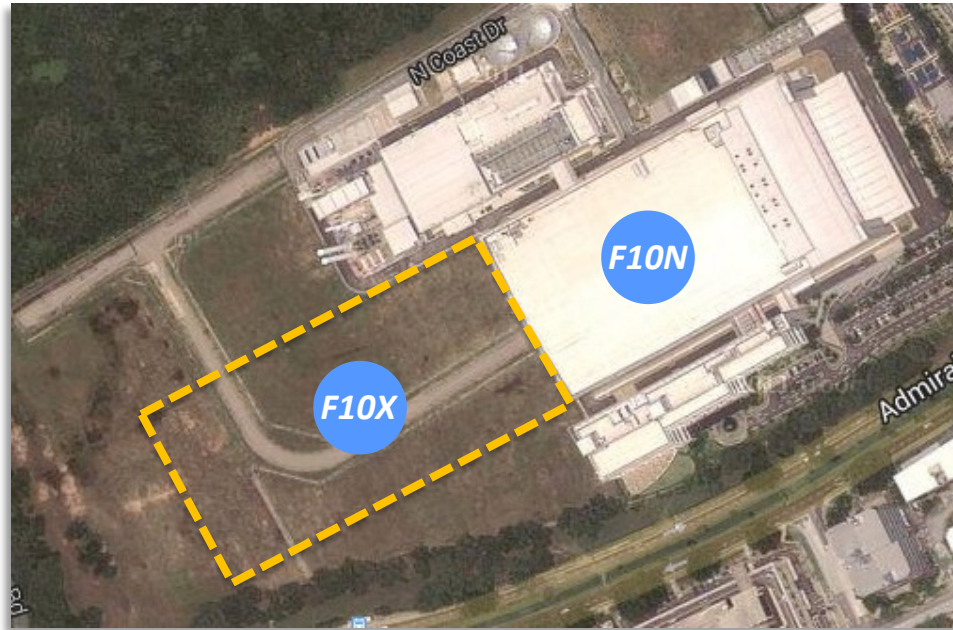
***We believe the new agreement provides for equitable sharing of the total economics over the long-term***



# Singapore NAND Capacity Expansion

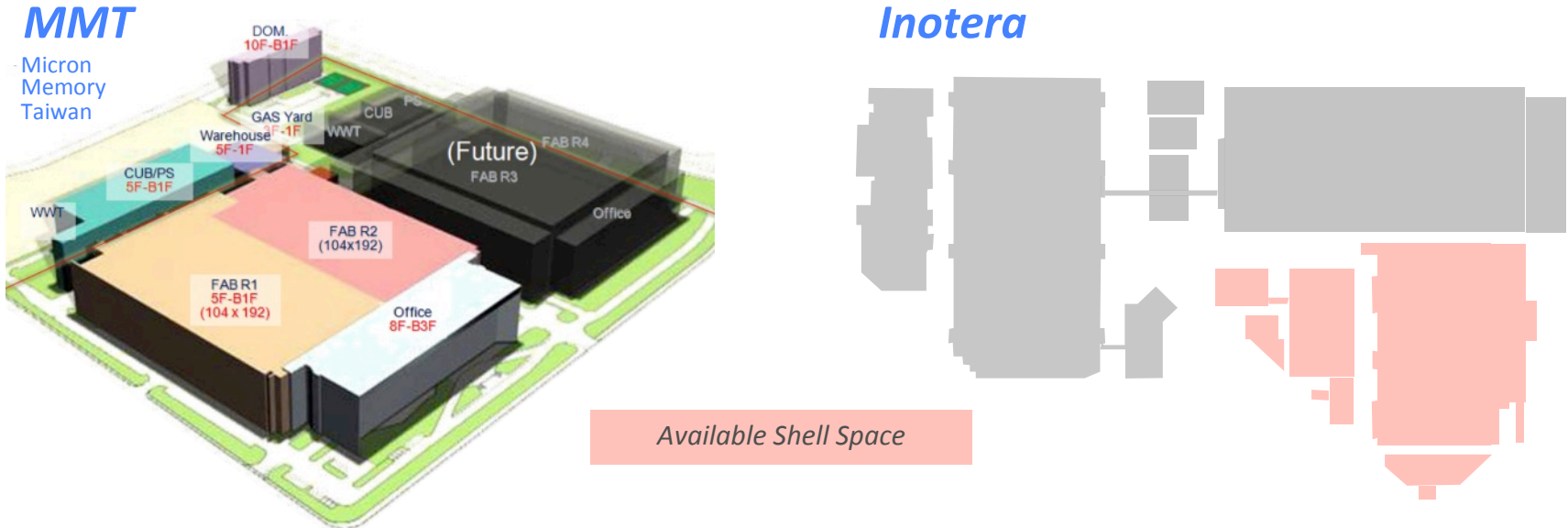
*Facilitate 3D NAND and Emerging Memory Transition*

## *Fab 10 - Singapore*



- Existing: ~140K WSPM on 16nm Planar technology
- Post-expansion: ~140K WSPM at Gen2 3D
- Supports ~40-50% bit growth average per annum over an extended time horizon
- Timing dependent on market conditions and expected ROIC

# Return-Based Approach to DRAM Capacity Planning




- Wafer capacity naturally decreasing with technology transitions
- Focused on technology enablement in 2015, below market bit growth
- Ability to add small increments of high ROIC capacity to existing scaled manufacturing operations
- Intend to maintain market share over the long term

# Summary

- Delivering strong financial results
- Market conditions remain favorable over the long term
- Leveraging world-class technology to improve competitive positioning
- Developing technologies and value-added solutions enabling innovation in key growth markets
- Positioning for the future of memory
- Deploying a return-focused strategy





# Q&A

# Non-GAAP Asset Reconciliation

Amounts in millions	FQ1-15	FQ2-14 to FQ1-15
Beginning of period:		
Total assets	\$ 22,498	\$ 19,794
Cash, current and noncurrent marketable investments	(5,353)	(4,408)
Current and noncurrent restricted cash	(84)	(65)
Non-controlling share	<u>(992)</u>	<u>(973)</u>
Non-GAAP total assets	\$ 16,069	\$ 14,348
End of period:		
Total assets	\$ 22,542	\$ 22,542
Cash, current and noncurrent marketable investments	(5,307)	(5,307)
Current and noncurrent restricted cash	(73)	(73)
Non-controlling share	<u>(1,001)</u>	<u>(1,001)</u>
Non-GAAP total assets	\$ 16,161	\$ 16,161
Non-GAAP average total assets	\$ 16,115	\$ 15,255

# Adjusted EBITDA Reconciliation

Amounts in millions	FQ1-15	LTM FQ2-14 to FQ1-15
Net Income	\$ 1,002	\$3,700
Interest expense, net	83	316
Income tax provision	75	123
Depreciation expense and amortization of intangible assets	643	2,255
EBITDA	1,803	6,394
Equity in net income of equity method investees	(124)	(512)
Restructure and asset impairments	1	44
(Gain) from asset dispositions	(6)	(4)
Loss from changes in currency exchange rates	21	43
Stock-based compensation	35	128
Adjustment to gain on Elpida acquisition	-	33
Flow-through of Elpida inventory step up	-	42
Loss on restructure of debt	30	139
(Gain) on Inotera issuance of shares	-	(93)
(Gain) from disposition of shares in Aptina	(1)	(120)
Legal settlements	-	66
Adjusted EBITDA	\$ 1,759	\$6,160

# Non-GAAP Net Income Reconciliation

Amounts in millions		FQ1-15	FQ2-14 to FQ1-15
GAAP net income attributable to Micron	\$	1,003	\$ 3,690
Non-GAAP adjustments:			
Flow through of MMJ and MMT inventory step up		-	42
Tessera license		-	66
Restructure and asset impairments		11	54
Amortization of debt discount and other costs		38	155
Loss on restructure of debt		30	143
(Gain) loss on acquisition of MMJ		-	33
(Gain) loss from changes in currency exchange rates		21	43
(Gain) on Inotera issuance of shares		-	(93)
(Gain) on disposition of shares in Aptina		(1)	(120)
Estimated tax effects of above items		(2)	(36)
Non-cash taxes from MMJ and MMT		38	24
Non-GAAP net income (loss) attributable to Micron	\$	1,138	\$ 4,001
		x4	
	\$	4,552	\$ 4,001

